The Builder.

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The New Westminster Bridge—Progress of the Works.

BY recent inspection of the works of the new Westminster Bridge, we are enabled to offer some account of their state of progress; and we avail ourselves of the opportunity to give more precise information as to the intended character of the superstructure of the bridge, than we could supply whilst features of the design appeared open to alteration. A portion of the arch-ribs, equal to one-fourth of the length of the first-commenced, or southern division of the bridge, indeed, has been standing, provisionally put together, for some years, on a site near to Battersea Park; but up to August, 1857, when a committee of the House of Commons reported favourably both as to the site and the intended gradients, it seemed possible that much of this preparatory work, as well as that of the foundations, would be rendered useless. Now, however, everything structural will be completed according to the design as it was in 1856, when the subject was prominently before us, or with the slight alterations assented to by the engineer; whilst the decorative character, to which we must revert shortly, will be varied only as regards some of the details of the upper part of the piers.

It will be recollected that there were several distinct questions (some of which had been often before discussed and apparently settled), raised in 1856, — that is to say, those of the site, of the sufficiency of the foundations, and of the headway for the river traffic; besides certain questions as to possibility of unequal settlement from the construction of the bridge in two halves, as to cost of removal of the old bridge, and as to the construction of the iron ribs—chiefly whether the means were adequate to meeting the effects of expansion and contraction in the metal. Our readers are already acquainted, by description and illustrations,* with the exact nature of the system adopted in the foundations. It was peculiarly well adapted to the circumstances of the case; since coffer-dams, whilst costly, would have been all but impossible (several of the new piers occurring in the present waterway of arches of the old bridge) without danger and complete obstruction to the navigation, or the alternative of removing the old bridge, or else of constructing each pier of the new bridge separately—thus prolonging the time of construction by many years. Our readers are also aware of our view of the economic importance of the system here,—and that adopted at Rochester, lately carried out under difficult circumstances at the Saltash bridge,—as regards the subject of "Metropolitan Bridge-communications." The system used at the new Westminster Bridge is the same as that adopted at the Chelsea Suspension-bridge, save that in the latter case the iron casing appears above water, and at the commencement of the works, may have been, used on the principle of the caisson,—wherein the joints being made water-tight, if necessary, the concrete would be deposited on the dried bed of the river, instead of being shot into the water through funnels.

The alterations made in the foundations of the new bridge, pursuant to the decision of 1857, were referred to by us at the time. The heads of the timber piles, which would have been, during some minutes, twice a day, two or three inches above the *estimated* level of low-water,—inclosed, however, in the concrete and the iron and granite casing, and covered by stone and brickwork—have now been cut down to 18 inches below the low-water line, along with the granite casing. This involved the refixing of the iron ties of the upper level; but it allowed the substitution of a projecting course of granite, forming a continuous capping, for the iron caps which were to have been put on to the iron cylinder piles subsequent to the fixing of the bolts to them. The granite capping-course would be better for resistance, supposing that a barge could at low-water strike the pier. The expense of the cutting and the refixing ties was estimated in July, 1857, at 1,980*l.* for the piers then advanced so far as to require the alteration, the work in replacement amounting to 922*l.* more, whilst the expense of the arrangement in the other piers and abutments throughout the entire bridge was estimated at 4,436*l.*

In the course of the protracted discussion on the question of the foundations, the report by Captain Burstall upon the state of the river appeared, wherein it was apprehended that the deepening of the river-bed would continue,—an impression which, if adopted, would have given colour to the objections brought by some authorities as to the value of the external concrete banking, as tending in any way to prevent ultimate undermining of the pier, or otherwise as protective of the concrete and gravel within the casing, supposed to be susceptible of disintegration along the line where the granite slabs bedded upon the heads of the sheeting-piles. The engineer, however, attaching a certain value to Captain Burstall's soundings in 1856, held that the conclusions that the river had deepened by scour, 10 to 14 feet, had been arrived at without consideration of certain circumstances, such as the extent of the dredging, which could not be estimated altogether at less than 1,500,000 cubic yards during the previous fourteen years. Any increased depth in 1856 thus was viewed as irregular and exceptional, and not as solely the result of action going on, and which would continue at the rate deduced from the supposed appearances after twenty-three years, since the removal of London Bridge. Nevertheless, Mr. Page had, in 1853, "contemplated a gradual increasing depth in the upper part of the river above London Bridge, the result of the increasing action of the tide, which in the course of ages would assimilate the above-bridge sections in a ratio to those of 'the pool,' and eventually, unless stopped by measures for protecting the bridges, give a depth of 29 feet below Trinity datum in the mid-channel at Westminster Bridge;" and, *consistently with this deduction*, he had then provided for dredging under the middle arches to a depth of 30 feet below Trinity datum. In 1857, he states that nothing had arisen since the date of his first design, to induce him to make further provision against scour than that (as indicated in the sections at page 466 in our volume for 1856, already referred to) against undermining, namely, the driving the iron sheet-piling down to 38 feet below Trinity datum, and so leaving 15 feet of ground above the feet of the piles.

In regard to the manner of building the two halves of the bridge so as to avoid unequal settlement, or to obviate consequences should such settlement ensue, it seems first to have been considered that no settlement could occur—with the piles in both cases properly driven; but it is explained by the letter and diagram (in the Parliamentary Paper, 6th August, 1857), that the first rib of the second half of the bridge would be placed bearing upon a portion of the foundations constructed along with the first half of the bridge; and that, should there be settlement and any difference between that of the two parts, the arched ribs would not be ruptured or altered, except slightly, in their levels relatively, as the wrought-iron bearers transversely between the ribs, carrying the roadway-plates, would accommodate themselves to the irregularity, the bolt-holes being slotted or elongated to allow for the rise or fall of the bearers, and the resting of the latter on the flange of the rib that had settled.

The question of headway has been decided as according to the original design, or conformably with the views of Sir Charles Barry, and those of the importance of easy gradients for the land traffic as of first consideration. It was shown that the greatest number of vessels requiring to lower masts, passed under the arch No. 10 from the Middlesex side of the old bridge, or one which had a headway of 20 feet above Trinity datum. The headway in the new bridge will be 20 feet for the centre arch. The arch nearest corresponding with No. 10, or the sixth of the new bridge, will have a headway somewhat less than 20 feet; but from the smaller size of the arches in the old bridge, and their form, the difference in favour of the arch of the old bridge extends over a very small portion of its span in the centre; and the new bridge, therefore, even at the corresponding part of its length, may be considered as not materially different to the old, in facility afforded to the river traffic.

In regard to the expansion, it was estimated that by a difference of sixty degrees of temperature, the rise of the outer rib of the centre arch would not be more than half an inch above the mean line, and the fall half an inch below it—the rise and fall being very gradual; and this alteration even could, the engineer supposes, be reduced by coating the external arches with a non-conductor. Mr. Stephenson had suggested cutting part of the angle-iron of the upper flange of the wrought-iron ribs and inserting a wedge, to allow of the more easy rise of the arch. Part of the expansion will be met by rising of the arch and by compression of the material; but the state of Southwark Bridge, where the pavement of the footpaths is distorted through the want of any provision, and the precarious state of Sunderland Bridge in 1856, spoken of by Mr. Stephenson, show what might ensue from omission of special precautions. The longitudinal girders are to have vulcanized India-rubber inserted in the joints. It is worthy of note that the ribs of Southwark Bridge were originally intended to be secured by bolts to the masonry; and that these it was found necessary to have removed during the execution of the works.

The works of the southern half of the bridge are not so far advanced as we were led in 1856 and 1857, to believe they would be at this period after the resumption of the undertaking; but progress has been made otherwise. None of the iron ribs of the arches were fixed two or three days ago; but the piers and abutments of the first or southern half the bridge, are quite ready for them; and wherever the piers of the old bridge do not interfere, the piling and work of the foundations for the second portion of the bridge are in progress. The sixth pier, indeed, is quite complete, throughout the full width of the bridge, up to the springing; whilst No. 2 pier in the second half, is in course of completion, below low-water line, or thereabouts. The chief work of the foundations is interrupted at each rise of the tide, but perhaps as much by the rush of the water as other reasons, so far as regards that part of the work in which the diving-bell and diving-dress are employed. Careful observation now shows there is not the apprehended settlement.

We have presumed in the foregoing portion of our notice, that our previous accounts and illustrations had made our readers acquainted, as well with the general design of the superstructure of the bridge, as with the detailed character of the works in the foundations; but it may be well here to state the principal dimensions and particulars of the new bridge as it will be when finished, and as contrasted with the old bridge, in order that our further account of the structure, and the whole present design, may be understood. The new bridge will have seven main arches, whilst the old bridge has thirteen. Blackfriars, Vauxhall, and Waterloo Bridges have each nine arches for the water-way: London Bridge has five, and Southwark Bridge three. The thirteen main arches of the Westminster Bridge, however, comprise a greater length of roadway,

* See our volume for 1856.

or breadth of waterway, than the seven arches of the new bridge, by the space of one arch of the old bridge on the Surrey side, and two arches on the Middlesex side—the latter arches being included in the space of projection of the Houses of Parliament. There are three culverts, or flood-arches, on the Surrey side, in the new bridge, besides the main arches; and there is one such arch at each end in the old bridge, which is thus sometimes spoken of as having fifteen arches. The piers themselves in the new bridge, besides being further apart, will otherwise offer less obstruction than those of the old bridge; they diminish 3 feet or more between low-water and high-water line, being 10 feet to 10 feet 6 inches in the latter case (or at the springing, actually 2 feet above Trinity datum); whilst the semi-circular arches of the old bridge, springing from a line about low-water level, reach a dimension of 20 to 25 feet across, at the corresponding level. We have alluded to the disadvantages resulting from the semi-circular form, as regards the craft passing at high-water. The arches of the new bridge will be elliptical, very flat at the crown, and remarkable for the small space (2 feet 10 inches) between the soffit in the centre, and the surface of the roadway. This peculiarity (though seen in arches of less span) seems to have led originally to the idea of constructing three of the ribs differently to the others, and carrying them above the surface of the roadway, so that the centre rib would have formed part of an arrangement for the separation, still contemplated, of the carriage-traffic, as the others would of a separation of each footway from the roadway. The ordinary ribs were to have been constructed as now, of cast-iron and wrought-and-riveted iron, the latter material in the crown of the arch. The large cast-iron ribs were abandoned, and ordinary ribs substituted, chiefly from the belief that difference in the expansion of the ribs would be injurious to the structure. Space was gained by the change, especially important in the first half of the bridge when opened; and a deduction of 1,008*l.* was involved. At high water, 2 feet of the piers only will be visible; but 18 feet fall of the tide will show the granite sailing-course of the foundations, and the splayed plinth. Above this, the sides of the piers curve inwards to the level of springing of the arch, at which point, on a second broad splay or weathering, is a semi-octagonal pedestal, with base and cornice mouldings, which is to be surmounted by the gas-standards.

The whole length comprised by the seven arches and intermediate piers, to be terminated at each end by a pier of the same character, is, measuring from the centre of the one pier to the centre of the other, 820 feet. Adding to that, the length on the Surrey side, comprising the three flood-arches, and terminated, probably by a pedestal similar to one of those of the main piers, the length is 915 feet 2 inches. This is all that can properly speaking be considered to belong to the bridge. The approach on the Middlesex side, north of the Houses of Parliament, would add 205 feet, making 1,120 feet 2 inches, which the Surrey approach may increase to 1,160 feet. The old bridge, exclusive of the flood-arches, measures 1,002 feet 2 inches in length; but adding 79 feet 3 inches at each end, the space occupied by those arches, the whole length is 1,160 feet 8 inches. The breadth of the new bridge, inclusive of the parapets, will be 85 feet. Of this, about 40 feet may be first completed, affording a roadway of 30 feet, and footpaths of 9 feet, on each side, all temporarily, and the footpath on the north side overhanging on cantilevers. The north face of the whole bridge, completed, will be on the line of that of the present bridge. The old bridge measures 44 feet, as contrasted with the 85 feet. It was about 42 feet in the clear of the balustrades—now removed. The new bridge will be 84 feet 2 inches in the clear width. The width of roadway will be 53 feet 6 inches, divided into two ways by a curb, to separate the traffic, and there will, moreover, be a tramway next each footpath. The two footpaths will be 15 feet 4 inches each. The old bridge has a roadway of 25 feet 6 inches, and footpaths of 8 feet 3 inches. The piers of the new bridge, on plan, at high-water level, measure, from cutwater to cutwater, 106 feet 3 inches, and are 110 feet 6 inches on the same line, in the foundations. The breadth of the piers at the springing of the arch varies from 10 feet 6 in. to 10 feet, as stated. The span of the centre arch will be 120 feet; that of the next arch each side, 115 feet; that of the next, 104 feet 6 inches; and that of each end arch, 94 feet 9 inches. The largest arch of the old bridge has a span of 74 feet 6 inches; and the smallest arch of the thirteen, one of 63 feet 3¼ inches. The headway of the centre arch of the new bridge, 20 feet, as mentioned, above Trinity datum, is lower by 5 feet than that of the old bridge; and the height of the surface of the roadway above the same level is 22 feet 10 inches in the former case as compared with 33·14 feet in the latter. Thus there will be a difference of the greatest importance in winter time, between the gradients on the one bridge and the other. The gradient of the Middlesex approach will be 1 in 57, and that of the Surrey approach, 1 in 54, whilst to the centre of the bridge, we believe, the gradients will pass from 1 in 75 to 1 in 362. The old bridge, at the ends, is 1 in 22 or 23. Streets of London which have any such gradients are avoided in winter, and Mr. Stephenson mentions that Telford, when laying out the Holyhead road, regarded the limit of a "trotting-hill" for a stage-coach and horses as 1 in 32. The gradient to the present bridge originally was 1 in 15. Blackfriars-bridge is 1 in 24 or 25; but was originally 1 in 16. Vauxhall-bridge is 1 in 35, according to Mr. Walker. The approach to Waterloo Bridge, on the Surrey side, is 1 in 31. Southwark Bridge is very defective, the gradient on the Middlesex side being 1 in 22. For the sake of comparison, it may be stated that Charing-cross, from Craig's-court to King Charles's statue, a length of about 230 feet, is 1 in 27; the West Strand—Craven-street to Hungerford-market, for 100 feet, 1 in 34; Waterloo-place—Pall-mall to Charles-street, 330 feet, 1 in 38; and Regent-street—from Piccadilly to the County Fire Office, and Conduit-street, above Mill-street, each 1 in 42. The heights of the arches each side the centre, of the new bridge, above high-water mark, will be 19 feet 3½ inches, 17 feet 7½ inches, and 16 feet.

Each arch is formed of fifteen ribs, besides those of the ornamental facing, placed about 5 feet 2 inches apart,—except those under the foot-paths, three on each side, where the distances may be over 7 feet 6 inches. Those ribs are formed as before mentioned. The wrought-and-riveted-iron portion in the centre arch, is 52 feet 9 inches long (out of the 120 feet span), and 2 feet 4 inches in depth, and is of 1½-inch metal; in the end arches, the similar portion is 42 feet 3 inches long, and 22 inches deep. The portion in cast iron, in the centre arch, next each pier, is of the same thickness of metal; and measures 3 feet 9 inches at the haunch, or iron skew-back,—which latter portion, as we may call it, of the rib, spreads out to 5 feet 3 inches, where it is bedded upon an horizontal plate, and also buts against the next arch,—except in the case of the shore abutments, where the bedding surface is inclined, as an ordinary stone skew-back, and where the thrust is resisted by brick counterforts carried on stone landings and piles. The cast portion of the rib is in six pieces in the centre arch; the wrought portion, of course, has a much greater number. The section is the common I form. The fifteen ribs are strutted by transverse braces. For the flooring, partly carried by spandril-castings, cross bearers, 2 feet 9 inches to 3 feet apart, are framed with longitudinal girders, so forming, from end to end of the bridge, four-sided spaces on which are to be fitted the Mallet's wrought-iron buckled plates as used in the Chelsea Bridge,—the paving being probably concrete and granite. The cast iron used in the whole bridge may amount to 4,200 tons; and the wrought iron to 1,370 tons,—each rib, spandril, and bed-plate being about 34 tons, or about 5 tons of wrought iron, and 22 tons of cast iron, besides 4 tons of cast iron in the bed-plates. The granite is chiefly from the Cheesewring quarries. There will be 165,000 cubic feet of it with other stone, 45,700 cubic feet of timber, 21,000 yards of brickwork in Portland cement, and 30,000 of concrete. Messrs. Cochrane have the contract for the iron-work. The foundations have been put in by workmen paid by the Commissioners of Works, under Mr. Page's immediate direction. This system was adopted under the idea that not only would time be saved, but considerable expense; since a contractor, new to the work, would feel obliged to estimate a large amount for contingencies. Whichever way the result in outlay, the precedent and experience will be not unimportant in future estimation of advantages of the contract system.

Of the decorative design, in details, we are sorry not to be able to speak so favourably as we should desire. The general characteristics of the superstructure, such as the great width, the lowness, and the easy gradients, the proportions of the piers to the arches, and the curvature of the latter, wherein the chief merits of the work consist, are in accordance with the design adopted by the late Sir William Molesworth; but Sir Charles Barry has repudiated "all responsibility in respect of the questionable taste of the details." Some opinion may be formed of these from a full-sized model of half of the centre-arch, which has been erected on the Surrey side, near the end of the bridge, and from one of the pedestals, which is executed in granite. The latter is at best, common-place; and the arch has a spandril filled in with foliated circles (the larger one, with double cusping, being intended to receive a shield), which in the proportions of the foils and the mitreing of the tracery, might be deemed open to criticism at this time when Gothic detail is so much in vogue, and perfect delineation of it is generally demanded. How far these slight shortcomings would be observable in the executed work, or from a distance, we can hardly say. The parapet, including a range of trefoliated perforations, may be more successful in effect. But we hope it is not too late to reconsider any of the details, so that every part may equal the arches in the character those particular and prominent features appear likely to possess, and the whole may prove to be deserving of the praise, which the bridge has received as probably the best in decorative design, of the bridges of the metropolis.

Mr. Page claims to be affording an example not only of a system of construction as to foundations, which economically secures great durability, and extraordinary lightness, as compared with the system adopted in the other bridges, but he points to the works which he has constructed, or is constructing, as costing generally, far less per square foot of surface, than the other bridges.

It seems that much erroneous supposition has prevailed as to the reason of the failure of the old bridge; the common notion being that the foundations were first laid, and the piers carried up, for a timber superstructure, and that the design being afterwards changed, the piers were widened, so that the foundations were made to receive what they had not been designed to bear. This idea, indeed, receives apparent corroboration from what may now be seen in the piers on the south side of the bridge, where the projections have been cut away so as to expose the interior rubble work and masonry. A small pier with its impost is actually built up in, or has been widened by, the masonry of the subsequent arches, springing from a lower level. There was, however, a design by Labelye, in May, 1738, described by himself, for a stone bridge with thirteen semicircular arches, and it is stated by the author of "Gephyralogia, an Historical Account of Bridges Ancient and Modern," that the piers were intended to be executed up to one foot above low water, and to serve for either a stone or a timber superstructure. Labelye himself says that "the very first orders" he had were, that he should "take the utmost care to lay the foundations of the piers, and to see that the stone piers themselves should be erected in such a solid manner, of such dimensions and with such precautions, as might make these piers capable of supporting at any time hereafter, the arches and the superstructure of a stone bridge" such as his design represented; and he subsequently describes small upper internal shafts of stone which were ordered, to serve for a timber bridge in the event of that character of structure being adopted. It is, therefore, clear that the failure in the old bridge was due to the want of due precautions or foresight in the construction of foundations for a *stone* bridge. The platforms of the piers, originally, indeed, below the river bed, are now in several cases above it; whilst the piers are kept up only by the sheet-piling, and other contrivances adopted at the enormous expense incurred for the maintenance of the structure,—83,097*l.* between 1810 and 1838, 107,124*l.* additional, to 1846, and a considerable amount since.

DECORATIONS, MATERIALS, AND PROCESSES AT THE ARCHITECTURAL EXHIBITION.

In returning to this part of the collection in the galleries in Conduit-street, we would add a few words to the notice given last week of Mr. Burges's furniture. Mr. Burges's skill is so considerable, that we cannot consent to allow him to get into what seems to us a wrong course without an endeavour to point it out. The work, and indeed the fancy, which there is in them is great, in the minutiæ of surface enrichment, and especially in the pictorial subjects so freely introduced. But in general outline, are they elegant, or consistent even with the best principles of Gothic? which are opposed to that caricature of structures to be met with in the table or altar furniture, and in the illuminations of manuscripts, which last Mr. Burges's designs thoroughly reproduce. The representation of tiled roofs, and traceried win-

dows, and the imitation of masonry in furniture, seem to us a mistake.

Mr. Kuckuck, we suppose, will learn nothing, and forget nothing,—see his "Prize Designs for the Decorations of the Princess's Theatre, executed September, 1858" (23). Compare with these the admirable exhibition of right principles which there is in the drawing-room and library-doors, that have been decorated by Messrs. Aspinwall and Monkhouse (367 and 368). Not only do these specimens of work show how doors may be treated without resort to graining for the variation in effect which has afforded the best defence for the practice (shown, however, previously in some works of the Adams), but they evince perfect recognition of the right use of natural forms—conventionalizing them, without shadow, or attempt at relief, when on the flat surface; and treating them on pictorial principle only where in framework. The panels of these doors in themselves display some excellent qualities, especially in the manner in which the flowers and leaves are grouped, with a reference to Shelley's "Sensitive Plant." The mottoes also are well brought into play. The decorators have been assisted, in part of their design in each door, by Mr. A. Waterhouse, architect. In the library door, the decoration is motived by the mottoes selected: thus, in conjunction with "Learn from the past," an attempt is made to indicate the spirit and character of Gothic art. And in the panel bearing as a motto "Use well the present," the endeavour is to express the desirability of reverting to Nature,—or the present.

At the end of the great gallery, where these doors are placed, will be found a number of cartoons for stained glass by Hardman, Clayton and Bell, Lavers and Barraud, and others. Those by Clayton and Bell are for windows now executing for St. Michael's Church, Cornhill, where Mr. Scott is cleverly turning the Italian of Wren into Italian Gothic. There is much refinement in the drawing of the cartoons. Messrs. Lavers and Barraud are making praiseworthy exertions to advance, and bid fair to do good service in their department.

In the opening or lobby which leads from this gallery to the North Gallery, the London Parquetry Company have placed a number of specimens of their *waterproof* veneered panelling, by means of which they say they are able to panel and decorate in any style the dampest wall or ceiling immediately after it has been plastered or cemented. Whatever may be the ability of the veneer to resist damp, it must be much better to work upon a dry wall or ceiling than a wet one,—and means should of course be taken to obtain this whenever possible. Several of the specimens are very good.

Some of the contents of the North Gallery we have already named. Messrs. Hardman have there a case of Mediæval metal-work, not better nor worse than what they have sent before, and therefore very excellent: a wrought-iron casket and small swing bracket are particularly so.

In connection with metal-work, we may mention that Messrs. Hart were too late in applying for a stand, and were unable to obtain it. On the opening night, however, they exhibited many good specimens of brass-work in the tea-room, besides some elaborate wrought-iron hinges and braces for the north door of the church of St. Mary Redcliff, at Bristol, prepared from the designs and the directions of Mr. Godwin. These hinges, which with the fastenings are to cost for the two doors 50*l.* are still on the premises.

Hobbs, Ashley, and Co. (No. 6), exhibit various locks, made by their patent steam machinery, by which they are able to produce good *common* locks (a thing much needed) at moderate prices. The interest excited by Mr. Hobbs's lock-picking achievements had the useful effect of directing attention to the improvement of locks generally. The firm have built a large manufactory in Islington, where steam and machinery do nearly everything. For a mortise-lock there are about thirty pieces required; and these, although made in thousands, all fit together at once, with the greatest precision; while, where a *difference* is required in order to give certainty, this is effected with equal certainty by an arrangement of machinery.

In connection with their locks are shown Messrs. Pugh and Co.'s furniture, to the merit of which we have before now directed attention.

Messrs. Botten's Closets and Valves (8); Howard's Regulating Valve (9); and some capital hydraulic brass work, by Messrs. Hayward, Tyler, and Co. are close by. Messrs. Henry Doulton and Co. (11) send some smoke and air flues, invert blocks, drain-pipes, and other articles, in stoneware of a good description. Cottam and Co. have a gate of wrought and cast iron, 7 feet 6 inches by 3 feet 10 inches, and some grilles and railings, very creditable. The white moulded bricks of Fayle and Co. (15) present an excellent appearance, and deserve notice. These bricks have been used at the Middlesex Industrial School, Feltham.

No. 18, apparently omitted in the catalogue, is a carved marble chimney-piece by Messrs. Edwardes. The acanthus-leaves of the centre are attenuated and poor, and the effect of the pateræ at the angles of the fire-place (pressed down in one corner, so as not to project before receding mouldings), is not pleasing; but the carving is exceedingly well executed, and shows that Messrs. Edwards are in a position to execute first-class work, if it be entrusted to them.

Messrs. Arrowsmith exhibit designs for their *solid* parquet floors, but none of the parqueterie itself. Of the capability of the work we have already spoken more than once.

Mr. William Potts has sent a chimney-piece and some other specimens of his combinations of bronze work with marble and wood. Mr. Potts has been working at this for several years, and has now opened a place in Lincoln's-inn-fields for the sale of his productions. He has obtained the aid of Mr. Jefferson as a modeller, and seems determined to produce good works. Some of the works that we have seen deserve high commendation. The special mention made of them at the Institute of Architects is referred to in another page.

Our review of the general exhibition we shall continue next week.

ON ARCHITECTURAL REFINEMENT.*

WHEN I am requested to read a paper, the subject of which is left to my own choice, I am apt rather to take one which I wish to see fully and efficiently treated, than one which I feel competent to handle myself. It is, I assure you, in no presumptuous spirit that I approach, on the present occasion, a subject, the proper treatment of which demands a far higher amount of knowledge and power of discrimination than any to which I can lay claim. An essay upon architectural refinement would call for not merely a general acquaintance, but a close intimacy with every style of architecture which has prevailed; and an amount of study, the extent of which may be guessed at by the reader of Mr. Fergusson's handbook. Still, as even a superficial observer may be able sometimes to make suggestive remarks, I hope that the few hints I shall throw out in my present paper will not appear altogether useless or impertinent. I shall have to repeat much that has been said before, both by myself and others, but for this I make no apology, as the lecturer, like the architect, who is always aiming at something new and original, is pretty sure to bring forward a good deal that is worthless. We may safely take it for granted that no human art ever was, or ever will be, absolutely perfect,—that there will always be ample scope for improvement, new excellencies to be developed, and faults to be corrected. A high standard of perfection ought to be set before us for our attainment, and should it be reached, a still higher one must be contemplated. The work may occasionally be advanced by a great and decided step, but it is more usually by a slow and almost imperceptible process, the results of which must be taken at considerable intervals to become distinctly visible, that art makes its progress. And if the art be a living one, this process of refinement will always be taking place: there will always be an effort to attain such beauties as show thought, care, attention, and the exercise of sound judgment, and to clear away all that is calculated to offend a cultivated taste.

But you may ask, has not art frequently, nay, universally declined under this process of refinement? Are we not to look for the best examples of a style at a period when its vigour has not been softened away by continued attempts at finish? when there still remain some roughnesses, which, so far from displeasing, give a certain point and character that might otherwise be missed. Undoubtedly this is very generally the case, and from several causes. One is, that a system which conduced to improvement up to a certain boundary, is made to pass it, and after that it becomes a debasement instead. For instance, the Doric of the Parthenon is a refinement on the Doric of Corinth, as being considerably lighter; but in temples of a later date, the process of lightening the style is continued, till its character of massiveness and dignity is altogether lost. This is the case in the smaller temple at Pæstum, which serves as a foil to the magnificent temple of Neptune.

Another cause of decline is, that in the pursuit of some excellence of a lower order, we are apt to lose sight of those of a higher;—that while we are endeavouring to attain elegance, or classical correctness, we may be sacrificing power or sublimity. Not that these merits are in themselves incompatible with each other, but it may easily happen that the genius suited to the development of one is not calculated to attain the other.

Again, we may entertain a false notion as to the steps essential to refinement. We may consider *that* to be an improvement which is in fact a debasement, as the later Gothic architects did, when they introduced Classical details among those of Mediæval character, and thus struck a fatal blow at the style they were studying to advance. I might, if necessary, adduce many more instances of false refinement, or over-refinement, but it is needless to enlarge upon the subject, beyond noticing such examples as may occur in the course of our present considerations. But this risk of introducing false refinement offers no reason why we should suffer art to stand still, without making any effort towards its advancement: if we are content with inaction, we shall be sure to lose, without a chance of gaining anything: if we aim at progress, we shall probably gain something, even though by an unlucky step we may happen to incur some temporary loss. When I speak of a refined style, I must be understood to mean one that not only bears the impress of past improvement, but one which is continually receiving fresh improvements, and which presents no obstacles, in the shape of radical and inherent defects, to an unlimited amount of improvement. A low phase of art may easily be advanced to a point beyond which it is impossible to proceed. In high art the impossibility consists not in any irremediable defect or insurmountable obstacle, but in the limited measure of power and genius on the part of him who approaches it. And a higher style of art may abound with faults, but they are not irremediable; and the skill and perseverance of the artist should be called into exercise to the uttermost to discover and apply the remedy. No true artist, whatever be his branch of art, will rest content without doing something towards its improvement, either in developing beauties or correcting faults: he will not think all is done which is required of him when he has learned to work according to certain received rules and precedents: he must try if he cannot refine upon them by studying, and, if possible, carrying out still further the principles which guided the great masters on whose authority they were laid down. Nor is he to spare the faults even of these. The works of men of the highest genius are often the fullest of faults. You will probably find enough and to spare in the productions of Michelangelo and Sir Christopher Wren. They had something else to do besides finding out the faults of the style they had chosen: they saw its capabilities and were intent on bringing out its excellencies, leaving to minds of a different cast the task of criticism and correction. Look at the manner in which they handled the style; the vigour and expression given it by the one, the grace and beauty attained by the other. There is a front of a house in Florence attributed to Michelangelo, and I can well believe, rightly. It is of small extent, and merely forms one of a continuous street. I do not remember that it had any features with which one is not perfectly familiar, and which we may not meet with a hundred times in any street possessing architectural pretensions; but still there is such an air of dignity in the composition, such an evident propriety in the arrangement of the parts, that I could not help being convinced at once of its excellence. It was clear that the architect had a perfect command of his style. The same thing, I remember, struck me in a house in Trent. I do not know by whom it was designed; but there were giants in those days. The prints of the church designed by Michelangelo for Florence give us the idea of a building of wonderful sublimity; unrivalled, except it be by Sir Christopher's more complex model of St. Paul's. These works, doubtless, have many faults; I mean real faults, not mere violations of conventional rules; yet their authors were among the greatest refiners of the style they adopted.

But persons who turn their attention to the discovery and detection of faults, to the reconciling of elements which have hitherto been brought together with too much appearance of incongruity, to the better arrangement of what

* Read by the Rev. J. L. Petit, at the Architectural Museum, on the 16th inst. as already mentioned: the paper was illustrated with a large number of drawings.

has been misplaced, and the clearing away of all that is essentially meagre, feeble, or unmeaning; persons, I say, who contribute to this result, must occupy a high position in the annals of art; nor can we say that they evince a less amount of talent, though it may be of a different nature than the discoverer of new beauties. Each has his work to do, and according to its efficiency, the style, and indeed the art of which it is a branch, acquires new excellencies, and becomes capable of still more.

Mr. Fergusson most ably shows the process of refinement in the erection of cathedrals;—how the architects and builders took, as a general model, some one that had been previously completed, or advanced towards completion; yet, while they did not make any rash innovations, they were no servile imitators. They considered whether they could not surpass their model, either by bringing out new beauties, or carrying to a higher point those which it possessed, or remedying some defect. And hence it is that we can rarely visit a cathedral without finding that it has some peculiar excellence of its own.

The ancient Greek style is altogether one of refinement. Its constructive system is so simple that we can hardly speak of it as an invention. It must have prevailed from the earliest and rudest times. Nor were the Greeks likely to reject any refinements which other nations, as the Egyptians, may have introduced. They probably took up the art as they found it, considered what were its capabilities of advancement, and commenced their work of refinement accordingly; and to what a height they carried it we see in that unequalled work, the Parthenon of Athens, a building, of whose impressiveness no description, drawing, engraving, photograph, or model, can possibly convey the slightest idea. Study it by the help of these, and you will find it easy enough to compare Greek with Gothic, and settle it satisfactorily in your own minds that the one presents the perfection of mere earthly beauty, while the other embodies conceptions of heavenly sublimity. But such of you as have visited Athens (a visit very easily made), will, I think, confess that your emotions on entering the area of the Acropolis, when, having passed through the Propylæa, you command the full front of the Parthenon itself, are in some measure different from those you expected when you were studying the subject in cork or paper. I certainly never felt so powerfully impressed with a sense of the sublime by any work of art. And this sense is produced, not by mere size, for in mass it is inferior to cathedrals below the first rank; nor to richness of decoration, for its character is that of severe simplicity; nor to any picturesqueness or variety of outline, but to its exquisite refinement. You see at once that the master-minds of the age put forth their full power upon it; that they instinctively excluded,—indeed, that they could not have tolerated, anything that was coarse, mean, or incongruous; that they aimed at bringing out the highest beauties of the art, but yet in such manner that they should appear to be kept back, as it were, by a kind of dignified reserve, instead of being obtruded ostentatiously on the spectator. I will explain what I mean. Setting aside those invisible curves which have been discovered by accurate measurement, and which are only perceptible from their correction of optical errors, the only apparently elaborate line in the whole elevation is in the echinus of the capital. A most beautiful curve it is, and, you may depend upon it, exercised the hand, eye, and judgment of great architects. But observe with what modesty it is introduced—not positively shown, but only suggested to the spectator; for it can be really seen only in a section or elevation—a mode of viewing it which is never obtained. Now, if you estimate this piece of refinement at its true value, you will perceive that much of the practice of architects, chiefly in the Classical styles, is liable to criticism, namely, where they introduce curves which they intend as lines of beauty, obtrusively, on a large scale, in the most conspicuous parts, and so as materially to affect the outline of the building. I am sure those large curved buttresses which we so often see in churches of the revived Italian, are essentially wrong, both as wanting that firmness and decision which we look for in a buttress, and as parading ostentatiously a form of little value beyond its mere beauty. I cannot say that I like urns by way of pinnacles, nor balustrades in parapets, seen against the open sky, unless the roof is evidently used as a walk, and then they are in place. But if delicate and beautiful curves are introduced with reserve, both in regard to size and position, as in mouldings, in brackets supporting small weights, and especially in the lower parts of cornices, so that the spectator is at some trouble to find them out, they give grace and character to the design. The very nature of refined beauty is, that it improves upon acquaintance,—that the first favourable impression is not only one that lasts, but one that becomes stronger and more vivid. The true artist and architect know this, and take care that those masses which at first sight appear merely to produce a general effect, shall, on closer examination, be found to contain beauties only to be discovered by the careful and attentive. In this they have Nature as an example, who keeps her choicest treasures for those who search after them the most carefully.

To return to the Greek style, and its great type—the Parthenon. Everybody knows that the columnar style is said to be derived from the primitive wooden hut, and in the Parthenon we see represented the features which would most probably occur in such structures. The round column is capped with a sqaure tile or abacus, for the convenience of supporting the square beam, which is of sufficient length to cover the whole space between two columns. On this beam, or architrave, rest other beams, placed at small distances, and spanning the building, or the space between the wall and the colonnade, the projecting ends of which beams are seen at intervals between the architrave and the roof, for the support of which they form a framework. These in the Doric style are represented by the triglyphs, the open spaces being filled up by blocks of stone or marble, usually enriched by sculpture. The eaves of the roof, with such timbers as might be necessary for its further support, were *represented* by the cornice. But you will bear in mind that these elements of primitive architecture were never directly imitated or copied: *that* would have been a mere barbarism: they were just recognized, and the conventional manner in which they were represented became a source of graceful and appropriate ornament. And I believe the practice of these ancient refiners of art authorizes us to pronounce a maxim which, had it passed into a law, would have saved Classical architecture from many abominations. It is that we ought never to copy or imitate directly in one material, or system of construction, the forms and details which manifestly belong to another. If we want them, we must adapt them to our purpose by a refined conventional treatment. It cannot surely be right to build keystones, and large voussoirs, of brick, and this not as a sham, as when they are covered with stucco or plaster, but actually showing the brickwork. It cannot be consistent with true architectural principle to build straight horizontal arches, so imitating the beam or lintel of a single piece, when the slightest curvature would be sufficient to express the real construction, without causing the inconvenience which may arise from a more decided arch. In the brick houses of the last century I have always been most pleased with those in which the segmental window prevails, however nearly its arch may approach to the horizontal line. When the actual lintel is used, the straight horizontal line is in character. There are many ways of using brick in such manner as to secure a picturesque appearance, and a good play of light and shade; for instance, in those chimneys, the plan of which shows a number of salient and re-entering angles. Now, it has sometimes amused me to see this kind of chimney, evidently suggested by, and specially adapted to, the nature of the material, namely, brick, carefully copied in squared stone, a process which must have been somewhat troublesome and expensive considering the results obtained by it. There is a very simple and effective ornament in brick, which, at a cost not exceeding, I should suppose, that of placing the materials in plain layers, gives great richness to horizontal strings, and which seems to have been used as freely and commonly during the period of Byzantine architecture as it is in the present day. It consists of a series of bricks, set diagonally, so that the angles project beyond the surface of the wall, forming a sort of horizontal chevron course under a flat string. I am not aware that I have ever seen this ornament copied in stone, and I hope I never may; but it is far too good and effective to be altogether lost to the stonemason, and I am pretty sure I have seen it adopted, and adopted by refinement, in Roman work, the effect being given by a series of delicate grooves or flutings worked in the stone. The great error committed in Roman architecture appears to me to be not so much the attempt to combine and reconcile two different systems, the trabeal and arcuated, a problem involving in itself no insuperable difficulty, though its solution still calls for a high exercise of mental power on the part of the architect: the error, I say, appears to be not this attempt so much as the too distinct pronunciation of Greek trabeal forms, in a system of arcuated construction. The Roman architect had, indeed, this excuse, that the Greek forms were so refined that he could not easily refine further upon them. Still he ought, in such parts of his structure as were purely arcuated, to have found some other means than by direct copyism, of expressing his recognition of them, and applying to his own purposes the principles on which they were grounded.

We will not yet quit the Parthenon. I have said, that in the state in which we now find it, it struck me as the most impressive building I had ever seen. But what is its present state?—I say nothing of the terrible ruin of the intermediate part, between the two fronts, the effect of an explosion at a time when this architectural marvel was used as a powder-magazine; for the view with which you must still suppose me to be wholly engrossed comprehends little more than the full front; just enough of the ruin beyond, to make you sure that the temple has been worthy of such a porch. What I now notice is, that scarce a vestige of sculpture remains in the mass of marble before us; and yet, as an architectural composition, it gives the idea of completeness. I believe that if no sculptor had touched with his chisel a block of the marble of which it is composed, the Parthenon would still be, as it is, an architectural triumph; and we know that it was fully enriched with the finest sculpture that any age has produced. That it was built with the view of being so enriched; that it was intended to give such sculpture the greatest possible dignity, and to exhibit it to the highest advantage; and also to receive from it the greatest amount of adornment. Had we seen it fully enriched with its sculptures, we should have thought them a necessary part of the fabric: seeing it without them, we feel no imperfection as resulting from their absence. I say this advisedly. Pæstum has no sculpture, and does not want it; nor could I distinguish any tokens which would lead me to think that sculpture had been much employed in its decoration. *A fortiori*, the Parthenon appears complete without it: at least, my English eye did not miss it, whatever a Greek might have done. But, then, I must observe that the cornices and projections are much injured by time; and it is probable there was some difference in the arrangement of these, according to the intention of employing sculpture, or dispensing with it. I certainly noticed at Pæstum a peculiar depth of shadow, and some curious forms produced by it, which did not strike me at Athens. Be this as it may, it is clear that the Doric style may be worked out in a high degree of perfection without the aid of sculpture, and yet admits, without compromising its own character of simplicity, sculptures of the highest order, on which also it confers dignity by the positions which it assigns them.

On examining the building closely, we find that its workmanship, in point of careful execution, is worthy of its fine material, the white marble from the neighbouring mountain of Pentelicus. In some of the columns it is scarcely possible to perceive the joints; and it is clear that the greatest nicety must have been employed to give, by those minute deflections from the straight line to which we have alluded, the exact effect they were intended to produce, without forcing them upon the eye. To obtain an accurate view of the front of a Greek temple, so as to enable us to point out the actual convergence of the columns, I suspect to be even beyond the power of photography, as whatever means might be adopted to correct the convergence of even the best instrument, would not prove sufficiently delicate to show with certainty those small deviations. I commissioned a photographer at Athens to execute a photograph for me of the front of Theseus's temple, hoping to have an exact elevation, and chose a spot as distant as possible consistent with distinctness, but he thought the picture would be too small, and so went nearer: the result was, of course, perfectly useless, as far as the purpose for which I wanted it was concerned; and the other would have been inconvenient, from its small size, and would still have had the same inaccuracy, though in a less degree. I should think there were very few buildings in any other style whose minutest niceties might not be sufficiently conveyed by an ordinary photograph.

Now, I believe it is the opinion of some admirers of Gothic, that it is a style which will not bear statuary of the highest order, nor workmanship beyond a certain degree of accuracy. If this charge be a just one, then the Gothic is a style that at least, in one direction, opposes a decided barrier to advancement, since good execution on

the part of the workman is unquestionably an excellence, and a design that will not bear it must be wanting in refinement. Still less can an architectural design be a refined one, if the sculpture employed to embellish it must of necessity be of a lower order than the highest which the age can produce. For my own part, I do not consider Gothic as chargeable with this incapacity to avail itself of the most careful work, or the highest types of art, or the most delicate materials. The sculpture we meet with in German specimens, and the fine work we find in those districts of Italy where white marble is used as a material, convince me that the contrary is the case. But I do believe that our own northern Gothic must undergo some modification, must admit something of the Classical element, I do not mean in detail, but in feeling and in principle, before it can receive the full advantage that high art, precious material, and accurate execution are calculated to bestow. Indeed, I have little doubt that the refinements needed by the Gothic would bring it nearer to the Classical, as those required by the Classical would bring it nearer to the Gothic.

I have noticed the great impressiveness of the Parthenon as not being the result of gigantic size. Other larger buildings are far less impressive, and, I may add, give a less idea of actual size. You would probably set down a Greek temple as having greater magnitude than is proved by measurement to belong to it. This effect is, of course, due to the observance of proportion. It appears to be an error to suppose that fine proportion always reduces apparent size. It is said to do so in St. Peter's; but if the proportions have this effect, then, instead of being good, they must be bad; for such a church ought not to appear smaller than it is. Externally, it does not lose in magnitude, if we look at it from the proper point, that is, any point which does not command the principal front. The real cause of the apparent diminution (internally) is to be looked for in the defects, not in the merits, of the structure. In the first place, the canopy over the altar is decidedly larger than such a composition ought to have been. Consequently, the part of the building in which it stands loses both in dignity and the appearance of magnitude. In the next place, colossal figures of angels are perched among the spandrils of the pier arches, which are thus brought nearer to the eye, and deprived of height. Where size is an excellence, fine proportion increases it: where it is the contrary, there fine proportion reduces it. A figure beneath the size of life is raised up to the natural standard: a colossal figure is brought down to it. The essence of architecture is greatness: those cannot, therefore, be good or refined proportions which tend to diminish apparent magnitude. Exaggerated proportion, or, in other words, disproportion, is sometimes adopted as a source of sublimity: one feature or dimension is magnified at the expense of another, and consequently assumes an aspect of grandeur; but in this case there is at least a possibility that the eye of the spectator may be caught by the deficiency instead of the redundancy.

My first impression on entering Seville Cathedral was that of disappointment; and though every succeeding visit more and more convinced me of the grandeur and beauty of this edifice, still the feeling was one of which I could never wholly divest myself. The cause I believe to be the disproportion between the pier arcade and the clerestory. The smallness of the latter caught my eye, and weakened the impression which otherwise would have been made by the piers, which, for height and mass, are, perhaps, the finest I have ever seen (though a little more decision in their mouldings would have improved them), and by the arches, which are extremely beautiful in their form. The spring of the vaulting is on the horizontal line running above the points of the tier arches. There is no triforium, but a small gallery, or rather band, of open work. The clerestory in each bay is a small pointed window, with mullions and tracery, very insignificant in point of size when compared with the fine clerestories of Northern Gothic cathedrals. Had this part of the elevation at all corresponded in size with that below, I can conceive nothing finer; but in such case the actual height of the roof would, I believe, have exceeded that of any cathedral in Europe, and I am now speaking of the art of giving apparent height and size when the real magnitude is limited. The fault here, as at Milan, is the suggesting that further height would have been an object, which a window of tracery and mullions does. The proper clerestory window would have been a circle, and then no disproportion would have been felt. At Milan, though it may appear a paradox, the fault is less, because the disproportion is greater; the clerestory is so small, that we scarcely notice it, except to regret that it was not omitted altogether. But though the architect may succeed in obtaining sublimity by means of some exaggerated proportion, surely that building is more refined where an equal degree of sublimity is attained by means of really good proportion. We will compare in this matter two of the finest cathedrals in France. Bourges has two aisles on each side of the main central one. This latter has the arrangement usual in large churches of that date, an arcade of pier arches, a triforium, and a fine clerestory, the roof, of course, being vaulted. The adjoining aisles have also the same arrangement, namely, pier arches, triforium, clerestory, and vaulted roof, which latter corresponds with the pier arches of the nave, and is as lofty as the main roof of many cathedrals. Hence, if the central nave were removed, and its adjoining aisles brought together and made to meet at the crown of their respective vaults, a goodly cathedral would still remain. From this you may judge of the amazing height of the principal piers; and, as the eye is not struck by any deficiency in the features above, the height of the whole building, actually very great, is magnified in appearance by the disproportion. It is as impressive an interior as can be imagined.

Now let us look at Rheims. Here everything is in harmony and proportion, nothing exaggerated. The piers, solid, massive, and simple, even to plainness, in their mouldings, are evidently kept down in their height, rather than drawn up to the full extent which might have been allowed them, for the arches they support are considerably stilted, and their points fall very much below the string on which the triforium rests. The triforium is a mere arcade, without those subdivided arches which are almost universal in French cathedrals,—consequently, it is brought well within compass, and occupies, without any appearance of being crushed, crowded, or curtailed in its proportions, but a small part of the whole elevation. This gives room for a large and magnificent clerestory, the windows of which are remarkable rather for the width than the number of their lights. Although the span of the roof, taken between opposite piers of the nave, is rather beyond than within the average, yet the effect of great height is more fully given than in any other building with which I am acquainted, notwithstanding that several actually exceed it in this dimension. I believe the cause of this is the care which the architect took that nothing should appear crowded or curtailed in the whole design, and that no one feature should appear to be sacrificed to another.

I have remarked, that in statuary fine proportion approximates the figure (in appearance) to the scale of nature; but you must not suppose that I mean, by fair proportion, an exact adherence to the proportions of nature. When a statue is of the natural size, and intended to be seen on or near the level of the eye, the natural proportions, I take it for granted, must be observed as strictly as possible; but I can well conceive that some deviation is necessary when the figure is either larger or smaller than life, and meant to be seen from below and at a distance. Such deviations are not to be looked upon as attempts to improve upon nature, but as refinements of art calculated to make the representation more complete and satisfactory.

The existence of a style so beautiful, so refined, and so nearly approaching to perfection as that of Greece, could not fail of exercising an influence upon the first styles which might develop themselves on the introduction of that new element—the arch. Nor could this element, on the other hand, fail of affecting, to its very foundations, the system of Greek architecture. That system was an embodiment of pure art: science had very little to do with it, beyond that which was necessary to effect the movement of large masses of material, and also, in putting them together, to ensure the appearance of a proper adaptation of weight to support; but here is an element introduced which is the production of hard, mechanical, practical science; practical, I say, in opposition to theoretical, for the real properties of the arch seem to evade any test of mathematical calculation. I suppose the earlier kind of arch, formed by a number of brackets, and exercising no lateral thrust, was considered barbarous after the invention of the true arch which requires abutments; and yet the equilibrium of the former, as being a combination of levers, can be provided for and calculated, without taking into consideration the aid of friction and cement; an assertion which cannot be made of the true arch, unless its abutments be immoveable. Friction must be taken into consideration in estimating the strength of the arch constructed of voussoirs, and therefore the calculation must be somewhat rough and vague, and experiment after all must be the real test.

Now, this arch, and its near relation—the dome—are so convenient for the spanning of large spaces, and are withal so productive of beauty, sublimity, and variety in composition, that not to admit them as leading and characteristic features, would be to cut off from architecture more than half of its capabilities; and yet the Roman could not easily give up the column and entablature, on the refinement of which the genius of a nation, the most sensitive in the perfection of beauty, and the most cultivated in taste had been exercised for centuries. Their task was to amalgamate the creations of high imaginative art with the result of hard, utilitarian, experimental science. If they did not altogether succeed in arriving at the true solution of the problem; if the style they struck out was not without faults and inconsistencies, still they have left us a great and noble style, one which has proved the origin of others of great excellence and interest, and which itself admits of the highest degree of refinement.

But we will consider some of its defects, with a view of inquiring whether they can be removed, without destroying its beauties or characteristic features.

I have already remarked, that it shows its recognition of the Greek column and entablature by too plain an imitation (in places where they are not constructively required), instead of by some less obvious representation, by which we might be reminded of them, without having them forced upon the eye. The engaged column, much as it is used both in ancient work and revived Italian, I look upon (in most cases) as the reverse of a refinement; for the beauty of a column depends much upon its insulation, and our being able to see its true proportion from every point of view. And there is generally some little awkwardness in the line of junction between the shaft and the surface to which it is annexed. Besides which the engaged column is liable to be cut by some horizontal string, that, for instance, from which rise the intervening arches,—an interruption which by no means improves the beauty of the composition. It occurs in most, or probably all, of the Roman amphitheatres, and is of constant recurrence in modern work. In the beautiful amphitheatre of Pola, in Istria, the horizontal string is interrupted by pilasters which are not deep enough for its whole projection: the outer mouldings of the string are consequently taken in profile: the effect, as may be supposed, is anything but good. The same occurs in some of the plainer arcades of the Coliseum, in Rome. The least objectionable range of engaged columns (to my eye) that I know is that in the large crescent of Bath. Here the intercolumniation is occupied by plain, square-headed windows, without any horizontal string or moulding; consequently the lines of the columns are unbroken, and their convexity forms a pleasing contrast with the concave surface of the front to which they belong.

I have noticed in some of the Spanish churches of revived Italian that the engaged column is attached to a projecting strip of masonry sufficiently deep to receive any mouldings which may fall into it. This may also be the case in some English and other examples. The effect is good, or at least an unpleasing effect is avoided.

I should say that broken pediments, and indeed pediments of all sorts, affixed to the wall, might be wholly swept away without inflicting an irreparable injury on Classic architecture. A large amount of graceful ornament may be given in bands and horizontal strings. The Corinthian cornice, as treated by the Romans, is eminently beautiful, and its study would suggest many modifications of that feature when its full development is inexpedient.

The Romans do not appear to have made use of the column as a direct support of the arch till quite at the decline of the style. The palace at Spalatro probably offers the earliest example now extant. This belongs to the end of the third century. The mouldings, though not positively bad, have entirely lost that clearness and precision which characterizes Roman mouldings of the best period. The arches spring from the capitals of Corinthian columns without the intervention of any entablature or substitute for it; but the capital itself is more spread out than we find it in colonnades,—a deviation from the original type which renders it much fitter for its purpose, and, therefore, deserves notice. This arrangement of arch and column, though rare in ancient Classical work,

is common in the revival, especially during its earlier period. The old cathedral of Cadiz, a building of no importance as regards size and decoration, struck me nevertheless as a remarkably pure specimen,—pure in consequence of its perfect plainness; but it might have borne much enrichment without becoming debased. The Corinthian order is fitter for the purpose than that here used, whether you call it Doric or Tuscan, on account of the support offered by the capital to the angles of the abacus and their superincumbent weight. In the Romanesque and Byzantine styles a thick abacus, often somewhat clumsy in its size and form, comes between the capital and spring of the arch. The proper adaptation and enrichment of the abacus is still a desideratum.*

INSTITUTE OF BRITISH ARCHITECTS.

METAL DECORATIONS.

THE ordinary general meeting of the members of this Society was held on Monday evening last, at No. 16, Grosvenor-street; Mr. Henry Ashton, vice-president, in the chair.

Professor Donaldson said he had the honour to introduce Mr. Schweyer, a young Russian artist, from St. Petersburg, who had been travelling in Italy to perfect himself in his profession, and had there been his son's travelling companion, through whom it was that he had the pleasure of making his acquaintance. Mr. Schweyer spoke English as well as any native of this country: as the meeting were aware, the Russians enjoyed a peculiar facility with respect to languages: he had come as an artist to this country, and he might mention that last Sunday he had had the pleasure of showing him over St. Paul's Cathedral, from the bottom to the top.

Mr. C. C. Nelson then announced the contributions, which included some photographs exhibiting the finished model for the figure of Honour, known as the Guards' Memorial, of which Mr. Bell was the sculptor, and some publications by Mr. H. Roberts, on the condition of the labouring classes, and the dwellings which they occupied, with suggestions for their reform.

Some specimens of Mr. Potts's metal decorations, entirely the production of English artists, and to which we have elsewhere drawn attention, were exhibited.

Mr. Digby Wyatt said he had promised Mr. Potts that he would say a word about these products, because he thought them to be of a highly meritorious character, and also because he believed them to be specimens of an art which should be encouraged in England. When they remembered the beautiful effects that had been produced in Italy and France by the great masters of those countries, in the adornment of monuments by bronzes, they must feel that in this country, where the manufacturing processes were developed to the highest extent, if they were to employ the mechanical process, of which they had now an example before them, it might prove a most efficient aid to architectural embellishment. Mr. Potts, who had been working for many years at Birmingham, on smaller subjects, met with an artist named Jefferson, possessing great talents, which Mr. Potts was one of the first to recognize. Mr. Jefferson had studied in the schools of design in Birmingham and elsewhere, and had at last arrived at great skill in modelling.† Recollecting, as they could not fail to do, the gates of the Madeleine, at Paris, and remembering, also, that within a few years Alfred Stephens had designed some beautiful gates for the Museum of Economic Geology, which only required at that time that there should be some person spirited enough to see to their execution,—and also taking into account that at the present moment there was not a single specimen of bronze gates in this metropolis, they must feel that with the power to do it, as was hereby shown, only the will was wanting to bring in an entirely new kind of architectural industry; and therefore he heartily wished Mr. Potts success.

Mr. Mathews said the art in question was certainly not to be found in England some fifty years ago; but lately he believed it had been in operation. An exhibition of the kind had been established, to some extent, at the Crystal Palace, and a pair of gates had likewise been exhibited in connection with Messrs. Baily and Co. at Paris. The specimens at present before the meeting he regarded as very ingenious, and perhaps they might be considered as improvements; but Mr. Wyatt, he believed, on consideration, would admit the facts which he had stated to be correct. He did not claim any credit for himself, but for those gentlemen with whom he was connected in producing them.

Mr. Wyatt was very happy to acknowledge the admirable character of the castings to which Mr. Mathews alluded, and which, with the exception of some of the smaller castings of the Coalbrookdale Company, were certainly the best in the Paris Exhibition. The great beauty of those gates, he remembered, was their perfection of fitting, the parts which were cast separate being planted on so that the joints were not seen. But it must be remembered that the present specimens were produced by an entirely different process, and one of much greater economy; because in this case, however elaborate the mould might be, in hollowing out there was no coring or difficulty of that kind, for the copper deposited itself in the hollow mould; the electro-galvanic process being that which was adopted. The economy created by this means was so great, that for 1*l.* by this process a piece of work could be accomplished which would cost 4*l.* or 5*l.* by any other process, principally from the difficulty of making the cores.

Mr. C. C. Nelson thought that one great objection to bronzes of the kind proposed was the impossibility of detecting the thinness of them. There was a notorious example in Regent-street, where, in the case of the Cupids supporting the bronze lamps, the bronzing was a mere sham; you might put your finger under the toes of the figures, which, in fact, were no toes at all; for though they appeared to be solid, they were quite hollow underneath.

Mr. Wyatt said the best of the antique bronzes excelled in proportion to their thinness, and the difficulty now was that artists could not arrive at a proportionate thinness: it was the same way with works in silver.

Professor Donaldson said the bronzes at the Marquis of Ely's were so fine that they yielded to the pressure of the thumb.

Mr. Mathews said the bronzes appeared to be quite different, one being cast while the other was not; in one case the treatment was liberal, in the other it was purely mechanical. He wished that the old work which was seen at Hampton Court could be revived—the peculiar designs which were wrought in iron with a hammer, but it appeared now to be impossible to find workmen capable of executing these.

Mr. Bell said, in small figures produced by fire casting, it was advisable that they should be about the thickness of a penny-piece; but with respect to those which were electrotyped, they were of course much thinner. He wished to be informed as to the comparative durability of figures produced by the two processes?

Mr. Wyatt stated that about four years ago he executed a monument about 4 feet high, which was done by this galvano-plastic process: it had been exposed to the air during that period, and had stood perfectly well. The difference produced by the two processes appeared to be, that those effected by the galvano-plastic process were harder on the surface, but otherwise more brittle; while those which were cast were generally more homogeneous in their texture. It should be understood that these beautiful works of Mr. Potts's were most carefully executed; they were not to be confounded in any way with the attempt which the French had made to obtain a deposit on common plaster, but which process had entirely failed, and had never been taken up commercially at all.

Mr. C. Smith said it was a mistake to call these productions bronzes, because the deposit was purely copper.

Professor Donaldson said he had an interesting letter to read in connection with a communication which he had the honour to make on a former occasion, respecting the award published by the Sardinian Government, in respect of the plans that had been submitted in competition. The letter was from Mr. Jones, one of the late firm of Jones and Barber. The substance of the letter was to the effect, that Mr. Jones having failed to obtain a prize at the hands of the Sardinian Government, owing to the fact of his non-compliance with the official regulations in making out the quantities, that executive now wish to state, that regarding his designs as of superior merit, and wishing to retain them in the country, they would be willing to purchase them from him, and invited him to fix a reasonable price.* He had seen this official letter, so that there could be no doubt that the Sardinian Government had given to these gentlemen information that their designs were in every respect superior, and that it was anxious to obtain possession of them, of course paying them honourably and fairly for them. He considered it very honourable to England that prizes should thus be carried off; at the same time, that it should act as a warning to them, in all future competitions, to adhere strictly to the instructions given. Here were gentlemen who were first in point of ability, but who yet lost an honourable distinction by not observing accurately the directions which had been laid down.

The discussion on the subject of Metropolitan Improvements was then resumed. We shall report it in our next.

* To be continued.

† Mr. Jefferson executed a bas-relief for the Art-Union of London, "The Entry of Wellington into Madrid," some years ago.

* This would seem to explain the difference between the information received by us as to the result of this competition, and which we published, and the actual award of the premiums.

THE INSTITUTE OF ARCHITECTS AND THE ROYAL ACADEMY.

ON Tuesday last the discussion on the desirability of taking steps in connection with the proposed national grant to the Royal Academy (reported in our last) was resumed. The prayer of the memorial, which had been drawn up by a member and was submitted for approval, was as follows:—

"The Royal Institute of British Architects are therefore emboldened to suggest, that, in justice to the great body of eminent artists of all classes of the arts of design, and for the further advantageous development of the fine arts of this country, the rules and statutes of the Royal Academy should be revised; its privileges and distinctions no longer invidiously restricted to so limited a number as forty; that the minimum number of Academicians, as professors of any one of the three great divisions of the fine arts, should not be kept so low as to deprive them of a proportionately influential voice in the direction of the affairs of the institution; and that means of study and other advantages should be ensured to architectural students, similar and equal to those enjoyed by the students in the other branches."

Messrs. Fowler, Mayhew, Papworth, Ashpitel, Brandon, Wyatt, Donaldson, Mylne, and others took part in the discussion, and after a long debate the matter was referred to the council for consideration.

THE SOCIETY OF PAINTERS IN WATER-COLOURS AND THE GOVERNMENT.

THE Society of Painters in Water-colours have addressed a memorial to the Lords of the Treasury, with reference to the appropriation of a site at Burlington-gardens to the wants of the Royal Academy and of learned and scientific bodies, and earnestly appealing "to be allowed to participate in the grant, and to erect a gallery at *their own cost*."

The memorial points out that the "society was formed in consequence of the inability of the Royal Academy to foster water-colour art in its infancy; and, although the Royal Academy has numbered amongst its members many of great eminence who have occasionally practised water-colour painting, yet those who paint only in water-colours are excluded from any participation in the honours of that institution."

Further, "that the successful progress of water-colour art is mainly, if not solely, attributable to its being pursued as a distinct school, and to its works being exhibited apart from all other kinds of art; and this independence they are most anxious to maintain."

And it urges that,—"Education in the Royal Academy is confined to the professional student: painters in water-colours are the chief instructors of the public."

The society would require but a moderate space, and are willing to pay, in ground-rent or otherwise, for the area so occupied.

The request has our warmest support: but it would be necessary, in the event of its being granted, to give full consideration to the claims of the New Society, and, perhaps, so to extend the body as to make it include the whole profession. Schools should also be established under its direction. The New Society have likewise memorialized the Government.

Some particulars in connection with the foundation of the "Old Water-colour Society" may interest our readers,—a society, which for upwards of half a century has been the means of affording pleasure to the community, and has mainly contributed to the progress of this department of British art.

The society was originated at the time the art of water-colour painting was establishing itself in public estimation, and it was found that there

was no proper accommodation for drawings in the rooms of the Royal Academy.

On the opening of the first English Water-colour Exhibition, in Brook-street, Grosvenor-square, the Academicians were amongst the first to throng the rooms, and patronage and public favour soon flowed in. The original projectors of the Society of Painters in Water-colours held their first meeting at the house of the late Mr. Samuel Shelley, in George-street, Hanover-square —a miniature-painter of celebrity, and a *protégé* of Sir Joshua Reynolds. The parties were—Messrs. Shelley, Hills, Wells, Varley, Glover, and Pyne. The outline of the plan being arranged and made known, some few names were added. Subsequent meetings were held at the residences of the above-named originators of the society, and ultimately it was determined to form a society, for the purpose of opening an annual exhibition of water-colour drawings executed exclusively by members.

The first exhibition was opened to the public on the 22nd of April, 1805, at the great room in Lower Brook-street, Grosvenor-square, which was built by Vander Gucht, an engraver, who, quitting that profession, became eminent as a dealer in pictures. He was succeeded by his son in the same business. The premises, after the decease of this gentleman, who was much esteemed amongst the dilettanti and artists, were occupied by Mr. Thomas Barker, of Bath, celebrated for his picture of the "Woodman," who, in the great room, made an exhibition of his works. From Mr. Barker the premises were assigned to Mr. Tresham, and he, having little occasion for the great room, let it, together with its appurtenances, to the infant society.

The list of members making the first exhibition were, G. Barrett, J. Cristall, W. S. Gilpin, J. Glover, R. Hills, J. Holworthy, J. C. Nattes, F. Nicholson, N. Pocock, W. H. Pyne, S. Riquard, S. Shelley, J. Varley, C. Varley, and W. F. Wells.

The almost immediate success of the society, not only as regards attendance, but also sales, was extraordinary, and this was in a great measure owing to a plan, now general, which was suggested by one of the members, namely, having a person in the room who was furnished with a book containing the price of each picture. Conditions of sale were also inserted, and the purchaser, on entering his name, advanced a deposit of ten per cent. on the price affixed to each work, and bound himself to pay the remainder on the delivery of the purchase. Previously very few instances could be named of water-colour pictures having been purchased in the public exhibitions, whilst here the room at once became a capital mart for sale. Some thousands are now spent in London each year in water-colour drawings alone.

THE ACCEPTED DESIGN FOR MR. SPURGEON'S TABERNACLE.

WE have engraved the plan and the elevation of the principal front of the design for Mr. Spurgeon's Tabernacle, selected by the committee for execution. A general account of it will be found on a previous page (187). The accommodation afforded was thus stated on the drawings:—

	Sittings.	Standing room.	
Ground floor	1,572	 480	persons.
First gallery	791	 580	
Upper gallery	674	....	
	3,037	1,060	
		3,037	
		4,097	
Standing room in aisles		1,800	
Total		5,897	persons.

The estimate was given as follows:—

Carcass	£9,234	0	0
Portico	712	0	0
Finishings	4,156	0	0
Warming, fencing, &c.	852	0	0
Total	£14,954	0	0

The following communication from Mr. Pocock, in reply to a criticism on his design in our last (p. 207), will further elucidate his intentions and views.

WHILST I must controvert Mr. Garbett's opinion and dicta, as contained in his letter to you last week, I gladly acknowledge the tone of fairness that pervades his critique, and at once join issue.

I cannot admit that I was bound to defend the "bad art:" I chose rather to carry the war into the enemy's country; and as Mr. Garbett had contented himself with dogmatically asserting the whole fifty-eight designs were but an assemblage of something worse than rubbish, I considered myself equally at liberty to hint my opinion that he was not in a state to judge, and to declare my admiration of several, purposely excluding my own humble efforts. He now condescends to assign reasons, and so far as these involve general principles, you will probably not deem a small space devoted to their discussion ill appropriated.

In the first place, then, I must acknowledge I did not correctly interpret his expression "bad art." I supposed that by these useful but ambiguous little words, he wished to direct our attention to the æsthetics of architecture—that he regarded and spoke of architecture as a "fine" art. But if I correctly understand his latter communication, he would have us entirely discard all ideas of regarding our mistress in any other light than the handmaiden of bare utility, and that he would have us attempt nothing further than simply building plain walls and roofs, with such doors and windows as sheer necessity may require. But how far is this process of denudation to proceed? Shall we return to the wigwam and doghut? or why stop half way?

Utility is the first consideration, but not the only one. I will venture to say he patronizes broadcloth for his coat, and disfigures his head, as we all do, with a hat much like a chimney-pot, though a cheaper material would keep him as warm as the one, and a more comfortable tile screen him from the weather as effectually as the other. Why, then, does he go beyond mere utility? Because he thinks broadcloth looks better than fustian, and knows that both this and the beaver are by common consent employed to express a complex idea—respect for ourselves and deference to the opinions of others,—in one word, respectability. They do not constitute—nor even prove—the respectability of their wearer; they may be completely belied by his gait, the expression of his countenance, their own style, fit, or mode of putting on; but they are elements, generally speaking, by which, in London streets, we hastily assort those we meet. So the orders of Classic architecture, or the features of Gothic *may* constitute a caricature; but, duly applied, they may be made expressive of the noblest sentiments. And my argument is, that such sentiments cannot be conveyed in stone, but by the medium of forms and proportions, which, in the mind of the beholder, are associated with those sentiments. Why else had the architects of the sixteenth and seventeenth centuries no appreciation for Gothic architecture, or those of the thirteenth and fourteenth none for the noble remnants of antiquity? Why has each nation adhered to a style of its own—Egyptian, Greek, Saracenic? For the same reason that they respectively speak only one language, namely, that it is the only one they know, or their hearers can understand.

But let us follow Mr. Garbett into particulars. And first, he asserts that the two apsidal ends of the Surrey Music Hall are the only peculiarities of its *plan*; and, strictly speaking, he is perhaps nearly correct. But does he suppose that the committee, in using that expression, had no reference to the *quasi* division into nave and aisle, with the vaulted ceiling to the former? Evidently the competitors generally thought otherwise; and were not far wrong in their conclusions. But how does Mr. Garbett prove that the secret of the acoustics of this hall lies in these apses, and nothing else? is not affected by its proportions, its galleries, its ceiling, its materials, the position of its orchestra or speaker? I should take a satisfactory answer to this question as a great favour, for, after much study, I am ignorant enough to believe that in one short hour, or by building a single wall immediately behind the speaker, I could render him inaudible half-way up the nave. Nay, take away the galleries, and not half its occupants could hear, though the apses were left; but leave the galleries and square the ends, and little or no variation would be observed. So *I* believe. And I will be more humble than your correspondent, for I will assign a reason, and it is this. The difficulty of hearing arises not so much from *deficiency* of sound, as *redundancy*, that is, reverberation, and every wave of sound striking a hard body rebounds with a force and at an angle proportioned to those of its incidence. Now these waves are in the form of hollow parabolic spheres (so to speak), each within the other, like the layers of an onion, the speaker's mouth being the centre, and are consequently cut up by the galleries or other obstacles, which become the centres of new parabolas or spheres, constituting waves so diminished in force, and multiplied in number and direction, as to be powerless in their rebound to interfere with the original sound. By these means galleries are acoustically good, and greatly assist the hearing qualifications of a building. But the apsidal ends are so far removed from the speaker in this case, as to be, in my humble opinion, immaterial; the voice or wave being already spent before it reaches them, even were the galleries removed. And all the benefit that could, in a more ordinarily proportioned apartment, be derived from them, I expect I should secure by the angles of my plan being occupied by the projection of my staircases, though in rectangular instead of oblique-angled forms.

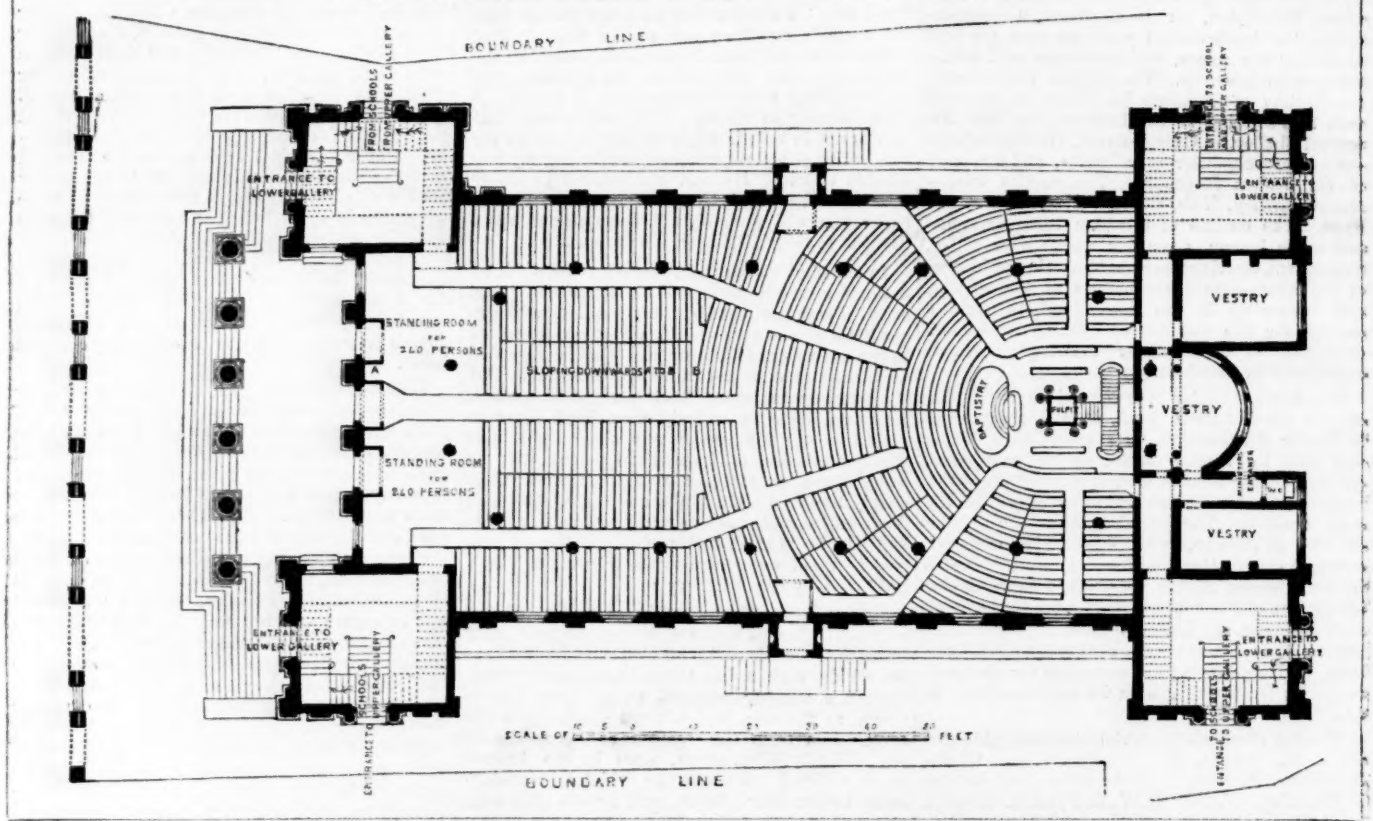
Your correspondent next arraigns my *circular* seats (the italics are his own). It was no fault of yours they were described as being in circles, for they are so drawn for expedition sake, as explained to the committee in my "particulars," in which I expressly stated they would be executed in short cants or tangents. But where does he get the word *circular* from? For once, then, Mr. Garbett is wrong in supposing a needless expense intended to be incurred, to save the artist's time, or to fill his pocket with commission, for so I understand him to assert; and if wrong for *once*, perhaps he is so altogether in charging his brethren with dishonesty. I do not pretend to his smartness, or I might affect to bewail so much wit and hard-hitting thrown away upon a myth. A clinching argument, a paragraph and a half, a flourish of trumpets, an alarming disclosure, a "*great lamp of architecture and engineering*"—all gone! Does our critic believe architects and engineers intentionally or indolently filch their clients to fill their own pockets? I am sorry for the company he has fallen into. I don't believe a word of it, but, on the contrary, that the vast majority of practitioners consider the economy with which they can husband their employers' resources one of their greatest merits and highest aims; or, to put it conversely, they are anxious to secure the greatest amount of result with the means at their disposal.

But as our critic kindly so far approves of those essential points in my design as to assert that they form the only rational mode of arranging those details, and as he baits his hook for my vanity with something about the "chance stroke of a great artist," I must not be too severe in return.

His next remarks amount to an assertion that a central entrance to a wayside building is wrong in principle. This I deny,—not in defence of my own design, but broadly. As a matter of fact, experience will satisfy any one that will take the trouble to observe, that casual visitors of any building almost invariably choose the central entrance, where they have the option of several. And as for regular attendants, who ever heard of a man selecting his seat at church or his box at the opera on the side nearest his own residence? And, especially in a place of worship, the centre is the most sought-after and highly-esteemed position—and naturally too; for, if you imagine yourself listening to a preacher, is it from a side-corner that you conceive yourself to be looking towards him? No, verily, but from the centre of the building; and, consequently, if going there (and you have, as we have supposed, no assigned location), the middle of the place is your centre of gravitation, and the central entrance is the natural and direct access to it; and this is confirmed by the practice of architects of all ages and all creeds. In theory, and in practice also, then, our critic's logic is at fault.

My *four* towers next fall under animadversion as to height, &c.; but confining myself to the general especially, because, like King's College, Cambridge, and St. John's, Westminster, I have designed two at the back as well as two at the front; and we are reminded that an animal has only one head and one tail, and the head of a boat is not like the stern. But have not many animals two legs behind as well as before? and does not the portico rather than the towers answer to the head, if analogy our writer must have? The head of a boat is made pointed, to cleave the water. Has the front of a chapel any similar duty to perform? Mr. Garbett is wrong in intimating that the two ends of the building have not the same use. In this case at least they have: the four towers are all alike staircases and ventilating shafts. But, setting this particular case on one side, is there a front and a back to all objects in nature? Do trees or plants present spreading

MR. SPURGEON'S TABERNACLE.——*Plan of the accepted Design.*



branches or spiring limbs on one side only? Is every mountain that has more than one peak a blemish in the landscape? Does the sun describe an arc of one kind in the forenoon and a curve of a different character in the afternoon? Is the egg a more beautiful form than the ellipse? Authorities I quote not; doubtless our critic despises all alike. In his eyes the Greeks were always fools: the fathers built their Parthenon, their Theseion, the temples at Pæstum, Agrigentum, Selinus, with both ends identically the same; and the sons their churches with cupolas on all four sides alike! yea, and all four sides equal in extent. Perhaps Mr. Garbett can tell us whether in the East animals have four heads, or a breadth equal to their length; whether boats are built square in those sunny climes.

It has been suggested that Mediæval architects erected their tapering spires to point us to heaven. I confess I never see St. John's, Westminster, without its suggesting to me the idea of its spreading its hands towards heaven in adoration of the Deity. "But who has more than two hands?" facetiously asks some one; "surely it must be elevating feet as well as hands!" A man has two *shoulders*, and as many hands. A square building confessedly has four shoulders, may it not have the same proportion of hands as a man? A very poor conceit this of mine, no doubt; but I will confess a worse—it was with the same feeling I put four turrets to my Tabernacle.

Mr. Garbett proceeds to condemn all porticos on eastern fronts, or having columns much exceeding the height (I suppose) of the human figure. He says those in "Metropolitan," which are 33 feet high, are some 30 feet too high to be of any use in affording shelter "*in* [I suppose he means *from*] moderately driving rain; the openings, five of the seven, where they are least wanted, in front; and, lastly, the whole not sheltering the most-used entries,—those of the wings—at all;" and, therefore, he declares it an "exceeding" (fie, printer! exceedingly) "bad one." In reply, on those points which affect this case only: driving rain in this country, indeed fully 9-10ths of our rainfall, comes from the south-west, and could not drive into the portico. The five doorways under the portico afford access to every portion of the building. The front openings in any portico are wanted, and I venture to assert will be used in this case, fully as much as the side ones, even by *pedestrians*; and, moreover, they are the only ones to which carriages could draw up. But the use of porticos to places of assemblage is not so much for purposes of entry as of departure; and in most Gothic churches of the present day the want of some shelter, under which a considerable portion of the congregation may wait for their conveyances, or prepare themselves to trudge through the wet, is a serious defect. As for putting up a portico in this country for a sun-shade, that is simply absurd,—for the few days in the year that the sun is too hot, we may safely leave ourselves to the care of the upholsterer.

Having disposed of the portico as a weather shade, he concludes it must be meant as an ornament, and as such declares it "most base or unchristian, because it uses a maximum of manual labour (and that of degrading kinds) to a minimum of the ornamentor's own [non manual?] labour." That is to say, I conclude, anything ornamental should be all ornament, and only ornament. But does nature teach this doctrine? The blossom is the ornament of a tree; is it not useful also? or does it cover the whole tree, or last all the year round? Who bestows the greatest amount of labour on the diamond? the slave in the mine, or the lapidary at his wheel? But if the above dictum be true, then inverting the terms, an ornament is rendered more noble or Christian by increasing the amount of the ornamentor's labour bestowed upon it; that is to say, the more highly wrought, the more noble or Christian. The latter clause of the paragraph now under consideration I do not understand. Of what noun does the pronoun "they" supply the place? This portico is voted a "*nuisance*" (the italics are Mr. Garbett's), because it costs all the light of the second room, or lecture-hall, whereas this said room has 75 feet of unobstructed window on either side, besides two or rather five windows under a portico, which, though it will not keep out the rain, will, of course, exclude every particle of light!

Much is made of the lecture-hall being the "second principal room," and such it really is; but it is a very bad second—far in the rear of the Tabernacle in importance, seldom used but at night time and by gas-light; and to sacrifice a central entrance or a spacious portico,—two main requisites of utility to the primary object of the building,—to increase the light of this hall some ten or fifteen per cent. would indeed have been a manifestation of "bad art" such as few would be guilty of.

But why vaunt so many feet width of entries into the *covered* part of your premises, when you have not half so many from the streets into your *whole* premises? Stay: 15 times 6 feet make 90 feet for my doorways; my gateways together measure 64 feet—nearly three-fourths;—and I suppose even Mr. Garbett knows more people will pass through one 9-feet gateway on the level, in a given time, than through two 6-feet doorways where there are steps. Still, the point of escape from fire, or rather in case of any alarm whatever, though a grandmother's, is a very sufficient reason, though Mr. Garbett may advocate the old school of narrow sinuosities.

His remarks upon the insurance question are not to our present purpose, though it seems on his principles, "most base and extravagant," to incur a larger expense where a smaller will effect the purpose; and the "prudent" arrangement sneered at, is evidently the cheaper, or would not be so universal. The close of the paragraph is again unintelligible, but if I mistake not, there are not less than four grammatical errors in it. I suppose all Protestants are separatists, indeed, all Christians; and the Jews themselves were separated from the heathen. Let Mr. Garbett remember there is no logic in a sneer.

There are practical difficulties in the way of tapering the aisles in the way Mr. Garbett suggests, which in most cases quite outweigh any advantage to be derived from it, and no part of the aisle requires to be so wide as the door of exit (unless it be for a few feet immediately adjoining it); in other words, the doorway always requires to be wider than the feeding passage, especially if there be any steps or turn. But many of the designs provided abundant aisle space as standing room. "Metropolitan" has on the ground-floor 36 feet of aisles to feed 42 feet of doorway.

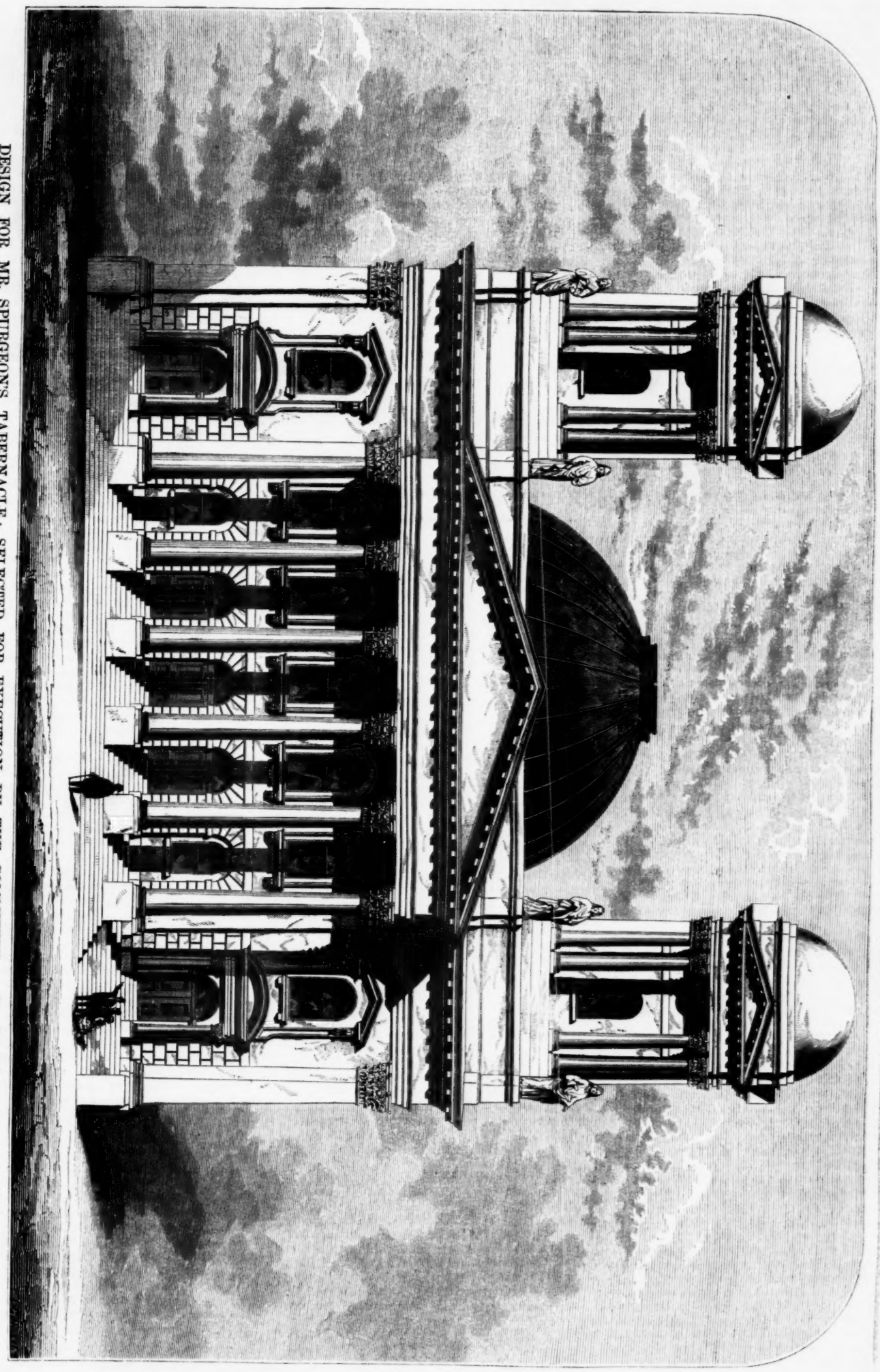
Our critic wants part of the basement for an air artery to the Tabernacle. He is welcome to the whole space between the floor of Tabernacle and ceiling of schools, which will enable him to admit fresh air as universally as he pleases. Had he understood the requirements of the case, he would have found it requisite that the lecture-hall should be in immediate connection with the school-rooms, so that nearly all the central portion of the basement, at least, must be devoted to these apartments; but why may not air come through the walls and roof, so that all six sides of the cube are free for its admission?

Our ironmaster would carry his four thousand persons, floors, galleries, and, I presume, roof, or a large proportion of them, on seven columns; and for economy's sake! Yes, of uprights; but what of horizontal supports? and what about foundations?

In one word, when our critic's reasons for condemning all our designs as bad art come to be tested, they fail; many of them are altogether wrong; others are, to say the least, questionable, and none can be taken as infallible rules.

Should time and your space permit, I may yet trouble you with some remarks upon his hobby—his *delenda est Carthago, i.e.* "commission."

WM. WILLMER POCOCK.



DESIGN FOR MR. SPURGEON'S TABERNACLE; SELECTED FOR EXECUTION BY THE COMMITTEE.—MR. W. W. POCOCK, ARCHITECT.

THE REMOVAL OF ST. THOMAS'S HOSPITAL.

THE *Lancet* of March 19 takes exception to part, at least, of the recommendation we made in the Numbers of the *Builder* of February 26 and March 12, in both of which we advocated the removal of St. Thomas's Hospital to a suburban district.

The *Lancet* agrees with us in so far as concerns the removal to the country of convalescent patients; but it lays down as a principle that, for patients other than convalescents, "it is one of the essential conditions of usefulness for such an institution that it be located in a populous district, ... for the reception of the sick poor in the immediate vicinity, and of those suddenly seized with sickness or maimed by accident."

We feel bound to dissent from part of this doctrine, and for the following reasons:—

First, the sick poor have to be removed from their houses in any case; and, if suitable means of transport were provided, it would, in the great majority of instances, matter very little whether they were carried a mile or two farther, while it would matter a very great deal indeed whether, having undergone the fatigue of transport, they were put to bed in fresh, pure, country air, or in foul, damp, town air.

Secondly, we believe that an examination of the hospital books would show that a very considerable proportion of the cases received are brought from the purer air and quiet of less densely-peopled outskirts into the foul air and noise of the present locality.

Thirdly, from inquiries we have made, we are justified in stating that, even after the sick are brought to St. Thomas's and other hospitals, and have undergone the risk of transport, a very large proportion of them might be sent off immediately into a country hospital with the greatest advantage.

Fourthly, it is a mistake to suppose that most of the accidents necessarily take place near the hospital which receives them. We find, for instance, that on a recent occasion, out of all the accidents (thirty-five) in St. Thomas's Hospital, two-thirds (twenty-four) of the whole number came from a distance of two miles and more, and eighteen of them, or half the whole, came from New Cross and beyond. New Cross is nearly 3½ miles by road from St. Thomas's.

We suggested Blackheath as a likely place to furnish a good site, on account of the purity and dryness of its air, the porous, self-draining nature of part of its sub-soil, and the great facility with which sick admitted at the present hospital might be raised to the level of the railway, placed in an easy carriage, and landed in fifteen or twenty minutes at Blackheath. Now it so happens that, of the accidents in St. Thomas's Hospital at the time we have referred to, fifteen could have been taken to Blackheath in cabs with less suffering than they underwent in being carried to St. Thomas's Hospital.

We do not on this account advocate the removal of all accidents indiscriminately into the country. We discussed this question in the *Builder* of August 28, 1858, in which we stated that "even in so vast a place as the metropolis, a few casualty wards, where accidents might temporarily be seen, rooms for the examination and reception of cases, and suitable vehicles for transferring them to the country, would be all that would be necessary to effect the reform." To this opinion we adhere. Let St. Thomas's Hospital be removed to Blackheath or to some other equally healthy and accessible locality: let a reception-room, and one or two wards for the treatment of accidents, until convalescence begins, be provided on part of the site of the present hospital, and all the rest of the establishment may be removed bodily with the greatest advantage to the sick.

Even severe accidents can be removed with safety at the very beginning, provided ordinary precautions be exercised; and a very small number of accidents would, in reality, require accommodation on the site of the present hospital.

In the *Builder* of March 12, we showed that the removal of the hospital was advocated twenty-seven years ago by Drs. Williams, Elliotson, and Roots; and by Messrs. Travers, Green, and Tyrrell, the then physicians and surgeons; and we have reason to think that their successors of the present day entertain no less enlightened and humane views on this most important subject.

THE PUBLIC OFFICE EXTENSION BILL.—Lord J. Manners has nominated the select committee on this bill, consisting of Lord J. Manners, Sir B. Hall, Mr. Whitmore, Sir J. Shelley, Mr. Stirling, Mr. Byng; and five members to be added by the committee of selection.

THE POSITION OF THE NATIONAL ARMORIES.

SOME years ago I addressed you on the subject of the proposed establishment of a museum of art at Brompton, and suggested that a collection of ancient Armour should form a portion of it, the nucleus of which might be derived from the ill-arranged and uncared-for mass of valuable specimens in the Tower of London. That letter, as you may remember, led to a very sharp correspondence, the result of which was confirmatory of the negligence and incapacity of the persons entrusted with the custody and management of the antiquarian portion of the Tower armories. The motion of Mr. Gregory, M.P. to appoint a committee of inquiry for the enlargement and re-organization of the British Museum has induced me once more to take up my pen and endeavour to enlist your services in an attempt to attain an object exceedingly desirable for the interest of art and the progress of archæological science.

The great and deserved success of the museum at Brompton has proved the increasing taste of the public at large, and their appreciation of well-arranged and classified collections, whether of the productions of art or of nature, superintended by competent persons and the approbation so generally bestowed on the first attempt to display a strictly chronological series of armour and weapons in the Exhibition of Art Treasures at Manchester, despite great local and other disadvantages, has shown what might be accomplished under more favourable circumstances, and how much it would be appreciated by the many who are desirous to acquire some information on this subject, but find it impossible to do so while hurried through the national collection by an ignorant beef-eater. I therefore venture to hope you will urge upon the gentlemen who may be appointed to inquire into the state of the British Museum, the propriety of removing from the Tower the more instructive and artistic portions of the national armory, and of placing it with the kindred antiquities now in Great Russell-street, under the care of an antiquary, in one of the compartments of that noble institution. Why should the ancient British shields and battle-axes, the Anglo-Saxon and Danish spear-heads, the Anglo-Norman swords—that fine one popularly attributed to Hugh of Avranches, Earl of Chester—and many other relics of early English warfare now in the glass cases of the Ethnological room at the British Museum, be separated by half the length of the town from the later specimens in the Tower armories? Why should the student, desirous to follow up the links in the chain, be compelled to take a positive journey to the other end of this monstrous metropolis—pay sixpence for admission, and be walked through a long lumber-room—it deserves no better appellation—in company with a dozen or more sight-seers or holiday makers, who, however intelligent, are not allowed ten minutes for the examination of any particular object? I have no doubt that, for a special purpose, he would, on proper application to the chief storekeeper, who is *ex officio* the custodian of these treasures, be courteously accommodated; but I am looking at the great object of public collections—the instruction of the masses, who pay for their support, and not the convenience of individuals.

In the debate upon Mr. Gregory's motion of Thursday in last week, the distance of the Brompton Museum was casually alluded to. Compare that, I beseech you, with the position of the Tower. There are hosts of omnibuses by which you may be set down at the very door of the former for 3d. 4d. or at the most 6d.; but there is no approaching the latter by land or by water in any public conveyance less expensive than a cab. London-bridge by a boat, or the Fenchurch-street station of the London and Blackwall Railway by omnibus, are the nearest points attainable. I know it to my cost,—I do not mean of pocket, but of time. Deeply interested as I have been for years in the study of this particular branch of archæology, I find, as an occupied man, a visit to the Tower almost impracticable for any benefit I could derive from it. The time occupied in reaching it—in waiting till a sufficient party is assembled for admission, and the impossibility, without a special permission, of examination or drawing, render it a hopeless undertaking.

At the British Museum I can stand for an hour, if I please, before any object that interests me without being obliged to "move on;" and, if necessary, there is to be found an intelligent person who will give me all the information I can reasonably expect concerning it. This latter advantage is, of course, out of the question at the Tower. There, as I have already stated, the principal storekeeper for the time being is the guardian by virtue of his office, and is neither required nor expected to know anything about ancient armour. He has important duties to fulfil, for which he no doubt possesses the necessary qualifications; but, as curator of the national armories, he is at the mercy of the dealer—one day purchasing a forgery, and the next rejecting an inestimable gem, which speedily finds its way to Paris, Russia, or some private collection.

That, notwithstanding the very limited number of antiquaries who have specially devoted themselves to the study of ancient armour, a large proportion of the public would take considerable interest in it, were they allowed a chance of becoming acquainted with its authenticated history, I feel convinced, from the continual inquiries I hear made upon the subject; but the extreme indifference of the Government is an obstacle which I despair of seeing removed except by "pressure from without," which can only be caused by public remonstrance in the columns of influential journals. I need not, I am sure, apologize for requesting the assistance of yours. A.

*** The present position of the national collections of armour and weapons is most descreditable to us: not one complete collection, chronologically arranged, and presided over by intelligence, is there to which painters, sculptors, writers, or students can resort with certainty and satisfaction to solve a doubt or increase their knowledge. If this were formed in a more accessible place than the Tower, a sufficient collection for the mere sight-seer might still be left there, and should be. If not moved, then a fresh arrangement should be made at the Tower, a proper custodian should be appointed (the best knowledge that can be obtained should be brought to bear upon it), and steps taken to perfect the collection as opportunities occur, and to render it as extensively useful as possible. We repeat that the present position of the national armories is a disgrace to us.—ED.

A TRUCE BETWEEN ITALIAN AND ANGEVINE GOTHIC.

WILL you permit an ardent lover of Gothic architecture, in all its national and provincial developments, to enter a friendly protest against the "savageness" which seems to have taken possession of the breasts of some of its advocates? Few amongst the pioneers of the study and revival of our old architecture have greater claims upon our gratitude and regard than honest John Henry Parker; and few among its practical revivers have given it more devoted study, or brought to bear upon it more artistic skill than Mr. Street. Why, then, should your columns be made the arena of an internecine war between these distinguished labourers in the same cause, merely because they chance to differ in a slight degree as to the amount of attention which should be paid to the Transalpine variety of the style to which both are devoted? Mr. Street has, certainly, detected a few inconsistencies between Mr. Parker's statements in different papers he had written, and pointed out some ludicrous slips into which his hostility to Italian Gothic had betrayed him; but what matters this? Every one blunders when he gets into an *ex-parte* argument. Mr. Street was unquestionably too severe upon these little errors; but surely Mr. Parker is acting most unbecomingly in speaking of men who have dedicated their highest energies and talents to the study of the same subjects with himself,—men who are known to have devoted to its practical development, as well as to the study of its ancient productions, a degree of labour, zeal, and earnest love, which has seldom been exceeded; and who have beaten foreign architects in open combat, and on their own ground, and their own most distinguished antiquaries being among the judges,—in terms of the most presumptuous contempt, and bringing against them accusations ridiculously puerile and untrue. Much as we may respect Mr. Parker, I deny that he has any claim or right to speak in such a tone. His own knowledge is extensive in its way, though his power of bringing it to bear upon practical questions is comparatively deficient, and even on the point on which he lays so much stress—the difference between the systems of vaulting in England, the Isle of France, and in Anjou—he is evidently in a misty state of mind, while it is clear that his opponent has given it more attention than himself, and is fully his equal in antiquarian knowledge. But let all these questions pass, and let us learn how to treat one another with the respect and deference due to each, and not abuse one another merely

because one set of examples may chance to have struck some of us more or less favourably than others. Both Mr. Street, in the letters in question, and Mr. Scott in his volume on "Domestic Architecture," and in his last lecture at the Royal Academy, have publicly disclaimed all wish to introduce Italian Gothic, though claiming for it a fair share of attention as a portion of a great whole. If Mr. Parker will dispassionately consider the subject, he will probably see that their views are fully as philosophical as his own, and that the difference between them is, after all, but slight; and I am quite sure that they will not yield to him in the interest which they feel in the examples of architecture, in that district of France to which he has more especially directed his attention, though they may dispute the exclusive claims set up in its favour.

One thing is a little startling in Mr. Parker's last paper. I refer to his mention of the Museum at Oxford, as distinctively *English* in its character. I am glad to find that it is so, as it confirms a theory I had entertained, that during the thirteenth century the secular styles of England, France, Germany, and Italy, were in essentials very much alike. I confess, however, I had imagined that the Oxford Museum had been somewhat Italian in its tendencies, and its talented architect a devoted follower of Mr. Ruskin; and certainly, after putting it forward as distinctively English, and as especially showing forth the capabilities of our own style, we may hope from Mr. Parker a little share of his charity in cases where he sees, or thinks he sees, a Transalpine leaning in the works of those who enjoy less of his personal favour. At any rate, let me beg that we may not have, from either party, any more of these displays of Gothic "savageness."

PAX.

LARGE IRON FORGINGS.

AT the Institution of Civil Engineers on March 1, a paper was read "On the Co-efficients of Elasticity and of Rupture, in Wrought Iron, in relation to the volume of the metallic mass, its metallurgic treatment, and the axial direction of its constituent Crystals," by Mr. R. Mallet.

Iron was formerly entirely worked under tilt-hammers; the process of rolling was then introduced, and now, in consequence of modern engineering requirements, masses of iron, of considerable magnitude, were produced by faggoting together, under heavy forge hammers, from large numbers either of bars, or slabs grouped together. The masses were not, however, found to possess ultimate strength, in proportion to the number of bars of which they were composed; in fact, it appeared that the strength of the mass became less in some proportion as the bulk became greater. This was admitted as a fact, but no one had hitherto attempted to show experimentally what function of the magnitude was the strength of a given kind of iron, manufactured in a given manner; or how the same forged mass, when very large, differed in strength in different directions, with reference to its form; or how the mechanical part of the process of manufacture of the same iron affected its actual strength, either as a rolled bar, or as a forged mass.

Addressing himself to this investigation, the author dealt generally with three points of the inquiry, viz.:—

1st deg. What difference did the same large bars of unwrought iron afford to forces of tension and of compression, when prepared by rolling, or by hammering under the steam hammer?

2nd deg. How much weaker, per unit of section, was the iron of very massive hammer forgings, than the original iron bars of which the mass was composed?

3rd deg. What was the average, or safe measure of strength, per unit of section, of the iron composing such very massive forgings, as compared with the acknowledged mean strength of good British bar iron?

The proper measure of the strength of iron, or any imperfectly elastic material, was the "work done," whether by extension, compression, rupture, or crushing, due to any force applied to it. The co-efficients $T e$ and $T r$ were designed, by Poncelet, to express this "work done," by an extending or compressing force upon any elastic prismatic body, at the point where its elasticity became permanently impaired and its form distorted, and at the further point where rupture occurred. The method of arriving at these co-efficients was then given, and it was shown that, though they were not sufficiently attended to in practice, yet that they were the true measures of the safe and ultimate resistance of materials, when applied constructively in machines or otherwise.

It had long been admitted, that large forgings became weaker in proportion as their bulk was increased, but as no definite ratio was recognized, it became of importance to fix the conditions of strength in wrought iron, under various circumstances. The author was enabled to undertake this investigation, under the authority of the Minister of War, and with the concurrence of the Royal Society, when making the forgings for the two 36-inch wrought-iron mortars, constructed on his designs for the Government; he then selected specimens of iron, upon which the experiments of tension and compression were tried.

In cutting and boring into the massive cylindrical forgings, to obtain the pieces of iron from the various parts, it was invariably found that there existed, internally, large transverse rents, with jagged and crystalline irregular surfaces, the opposite faces of which were counterparts, and presented distinct evidences of having been torn asunder by contraction from the centre towards the circumference, as the mass cooled. The *rationale* of the phenomenon appeared to be, that this action was simply due to the contraction of the external shell, before the temperature of the centre had been perceptibly lowered; this in its turn was cooled, and in contracting produced these visible rents, or fissures, and no doubt caused other minor dislocations which detracted from the general strength of the mass.

The practical illustration was, that almost all cylindrical shafts of wrought iron, exceeding 12 inches in diameter, were found to have one or more of these rents in them, thus having their strength impaired. This reduction of strength was altogether distinct from any deterioration of quality of the metal, arising from its being alternately heated, and cooled, and hammered.

The remedy for this play of molecular forces was to construct and work the large forgings hollow. This course had been pursued with success at the Mersey Iron Works, Liverpool. When a cylinder had a large concentric cylindrical hole along its axis, it cooled at the same time, though not equally, on both the internal and the external surfaces, and thus the extremes of internal strains were avoided, and the hollow centre yielded more readily to the forcible compressive grasp of the exterior.

The very weakest wrought iron of all those experimented upon was found to be that cut transversely from the end of a very heavy cylindrical forging, which had been exposed to heat and percussion for nearly six weeks. Exposed to tension, its elastic resistance was only 3¼ tons per square inch, which was less than the average of cast iron: thus, as regarded pressure, it was the very weakest iron produced by any method of manufacture; whilst the faggot bars, of which the mass was built and welded up, bore a tension of upwards of 12 tons per square inch before losing their elasticity, and of nearly 23 tons at rupture, and a pressure of nearly 21½ tons before losing elasticity, and of nearly 27¾ tons at the point of total distension, or crushing, thus proving the fact, that the extreme weakness of wrought iron, in heavy forgings, was not due to any metallurgical alteration in the constitution of the metal, but to changes in its state of aggregation, induced by the process of forging, by the long-continued and unequal heating, and by the hammering.

Hence was deduced the conclusion, that practically the iron of very heavy shafts, forged guns, huge cranks, and other similar masses, might be expected to become permanently set and crippled, at a trifle above 7 tons per square inch, and to give way by fracture, at about 15 tons per square inch by tension, and to completely lose form at pressures of from 15 to 18 tons per square inch. Therefore it followed that, allowing a deduction of one-half, as sanctioned by practice, from the elastic limits of tension and of pressure, for the margin of safety, the iron of such forged masses should not be trusted, for impulsive strains, exceeding about 1¾ ton per square inch of tension, and about 4½ tons per square inch of pressure, or for passive tensile strains of 3½ tons per square inch, or for passive pressure beyond 9 tons per square inch.

THE GLASS-BLOWERS' STRIKE.—The *Greenock Advertiser* states that the glass-blowers' strike has come to an end, and that the men—11,000*l.* laid aside to support the strike having been spent—resume work upon Monday next, without any advantage.

FASHION IN ART.

IT has long been a question with many who have been conversant with English art, to what extent the great mass of the educated public have during recent years advanced in the real appreciation of art, that is to say, how many pictures and other works are purchased in consequence of a particular fashion, or in consequence of their having a fixed mercantile value, and how many from a real feeling of admiration on the part of the purchasers. It has been remarked, that some of the best efforts of our modern painters, which they have little, if any, excelled, have been produced under circumstances of difficulty, and sold for the most trifling sum in comparison with their present value. The first pictures painted by Wilkie in London are striking examples,—for those works, if now sold, would produce as many pounds as they did shillings during the early career of this artist. This and many other similar instances might be mentioned, which have been quoted for the purpose of showing that great artists, in consequence of the want of general appreciation, have not, until a fashion has been set, met with that admiration which their merit deserved.

In considering this matter, we glance at the career of a number of artists, some of whom have rapidly risen to great fame: with others, the progress of success has been slower; but we remember but few instances in which true talent has not by persevering industry met with its true reward. There are such brilliant examples of genius as those of Wilkie, Maclise, Sir Edwin Landseer, and others, whose names and works have with surprising rapidity been brought into public esteem: in other artists, the early promise has been less distinctly fulfilled.

Years of ill-hanging, in exhibitions, &c. have caused difficulties which have only been surmounted by long periods of energetic work. In those cases art has been progressive: by careful comparison of their works with those of others; by study from nature, and otherwise, the works of those men have grown in merit, and, consequently, in the general esteem. This, however, is not, in the first instance, so much owing to the public appreciation of their improvement as to the advantages which arise from the opportunity which is afforded by brother artists of properly exhibiting their works, and by the placing them in companionship with those whose value is established, and thus giving them a position which causes them to claim attention.

The Royal Academy, the Exhibition in Suffolk-street, and those of the Water-colour Societies, &c. are a chief means of recognizing talent of the right description, of selecting between mediocrity and higher qualities, and thus at once placing those whose pictures bear the right impress amongst the list of those whose works will as surely bring a certain amount either at the picture-dealer's or the auctioneer's.

When once talent has met with this recognition from men practised in the principles and knowledge of art, it is almost a certain test that they have passed the somewhat narrow barrier between those higher qualities and mediocrity to which we have alluded. Narrow as this boundary is, the difference is distinctly marked, and the eye of taste and education in art readily recognizes the pictures of one class from the other.

Amongst the pictures of artists whose performances are just verging on the standard quality there are pictures which show an observance of nature; high mental qualities; a feeling for colour and light and shadow; an appreciation and ability to a certain extent to delineate character, &c. which give future promise, but are marred by particular defects. There are other works which are not far from being good, which show that they are the matured works of peculiar minds, and that little, if any, improvement can be expected. The pictures by these artists are ranged at great elevations in exhibitions; they crowd auction marts, where they produce little, if any more, than the cost of the frames; and great and continued are the difficulties with which this class of professors are beset if they do not engage the ability they possess in teaching, or some other useful employment; and it is to be noticed, that these are the artists who most loudly complain of the want of public taste and appreciation of art. Notwithstanding, we admit that but for the expression of the opinion by artists, in the first instance, and then the enlightened notices of artistic reviewers, a large mass of the educated public would not at the present time recognize the more refined qualities of art.

Owing, however, to the value which good pictures possess, it is seldom that they can be bought for

inferior prices. The pictures by Sir Joshua Reynolds, Hogarth, and other English artists, are yearly increasing in value: the accredited works of modern artists (both oil and water-colour painters) are now producing sums which would surprise the artists of the last generation.

In 1758, David Garrick bought Hogarth's pictures of the "Chairing of the Members," from the artist for 200*l.* In 1823 Sir John Soane bought them at a sale by auction for 1,620 guineas; and, no doubt, if now brought to the hammer, they would bring extraordinary sums. At the present day the price of 2,000*l.* for a picture by a living artist shows that high art is not without noble patronage. It is true that some painters who now have a good position, and whose pictures bring good prices, have for years had difficulty to exist. In some cases the early works have been bought at small prices by persons of capital, which have, on the strength of the reputation afterwards achieved, sold for considerable sums. We have carefully examined many of these works, and noticed their visible inferiority to those now produced. Under certain circumstances, some of these pictures have been nearly repainted. The early drawings of Turner, and some of those by Girten, curious as they are as examples of experiments in what might then be considered a new art, and exhibiting, as they do, instances of future eminence, would not be valuable, except in connection with the names attached to them; and similar instances might be multiplied. Our object in these short notes is, however, to show that there is a marked distinction between good and inferior art, and that while the latter fails to procure for its professors even a bare livelihood, the former, with prudence, is a certainty of competence; and although it may be that numbers rather purchase pictures in consequence of the fashion being set by others, there is hope, from the general advancement of artistic knowledge and taste, that the works of good painters, will become more appreciated from consideration of their high qualities, rather than as articles of furniture, which would at any time bring their price. As time goes on, the works, even those now fashionable and admired, will find a level lower than their present position; while others will, by the judgment of time, be raised in position, and in the succeeding generations numbers of pictures will descend into comparative oblivion, while others, like the pictures by Reynolds and Gainsborough, of the past generation, will stand out in bold relief, and become more precious than fine gold and jewels.

AN ARTIST.

THE ARMSTRONG CANNON AND OTHER WAR APPLIANCES.

THE Government appear to be resolved if possible to preserve the new ordnance invented by Sir William Armstrong as a secret for the public behoof of this country, while the press is equally intent upon gratifying the public curiosity in respect to it, whatever be the upshot as regards British supremacy. We have no desire to pry into the secrets of the Government on such a subject, but it can do no harm for us to record briefly what has already been published in regard to the Armstrong gun. From engravings of its supposed form in the *Mechanics' Magazine*, it would appear to approach much nearer than any other to the relative proportions of the rifle. In other words, it is long, and, comparatively to its length, of slender calibre. The bore is rifled, so that it is, in fact, to all intents and purposes, an enormous rifle. *Bolts*, properly speaking, rather than bullets, seem to be the missile to be chiefly shot from it, although shell and other forms are also spoken of. The implement is breech-loading. Sir William Armstrong has presented his patent to the Government, and it has therefore been suppressed. They must have been obliged, General Peel, the War Minister, acknowledges, to have given him almost any money for it; yet no condition or restriction was insisted on by the inventor; and although he will receive in the next ten years a sum of 20,000*l.* Sir William will do onerous duties, as the Government Engineer of Rifle Ordnance, for the 2,000*l.* a-year thus given him, while engaged in revolutionizing the army and navy ordnance. The new cannon will be only one-third the weight of the old, and it is asserted, it will literally realize the scouted idea of "the long range." Thus, in this as in so many other instances, the contemptuous sneer of yesterday becomes the congratulatory smile of to-day. The Armstrong will carry bolts no less than five miles and upwards; and, at shorter distances, its aim is so accurate that it strikes the object aimed at fifty-seven times for once of the old cannon. The power of artillery will by its aid be multiplied no less than fifty fold. There is talk of still more tremendous war appliances since this truly strong arm of the service became so renowned; but of the merits of these there is no authenticated account. A cannon is spoken of capable of firing once in three seconds, or 1,200 rounds an hour, without even unduly heating: it seems to be made of cast-iron, and cannot, therefore, have the advantage of lightness and portability possessed by the Armstrong, which is of wrought iron. A "Marine English Bull-dog" is also talked of, which is said to be "capable of destroying, in half an hour, the largest ship of war and her crew." Another terrible engine is said to consist of a leaden shell, charged with "liquid fire," which may be shot from rifles and set fire to ships, &c.

As for Sir William Armstrong, we have long regarded him as a distinguished inventor, and have frequently pointed attention to his hydraulic cranes, and his hydro-electric engine, for which he was made an F.R.S.; and we have no doubt that the Armstrong rifled cannon must have sterling merits of its own, over and above the insinuated objects of the Government in bringing it and its inventor into notice in the way they have deemed it proper to do.

Mr. Armstrong was, till within the last ten or twelve years, a solicitor at Newcastle-upon-Tyne. Thereafter he became one of the most extensive engineering manufacturers on the Tyne. His partners are to be employed by the Government in constructing the Armstrong gun, and the extensive Elswick engine works are to be greatly enlarged for this purpose.*

TAR AND LIME.

ONE of your correspondents, "A Builder" in your last number, asks how he should mix gas-tar with lime in order to make a mortar impervious to wet. I have always adopted the following method:—Provide a square wood-trough, say 8 feet by 4 feet by 1 foot 4 inches: put a quantity of fresh lump lime in: add water quickly. When the lime is well boiled, having assisted that operation by frequent stirring, add the tar (the heat of the boiling lime melts the tar), stir it well, taking care that every part of the lime is intimately mixed with the tar; then add sharp sand or crushed clinker, and stir well as before, after which, in about twenty hours, it will be fit for use.

I am not certain as to its beneficial qualities, and would be glad if any of your correspondents would go into the chemical part of the question.

SPHINX.

ELECTRO-TELEGRAPHIC PROGRESS.

THE Academy of Sciences has received an important communication from Professor Wheatstone, containing a full description of his Automatic Writing Telegraph, by which 50,000 letters may be printed off per minute. It consists of four distinct contrivances; viz.—1. A perforator, for the purpose of piercing holes in a long slip of paper, the relative position and number of these expressing the letters of the alphabet. 2. A transmitter, which receives the perforated slips of paper, and transmits the electric currents, produced by a voltaic pile, in the order and direction determined by the holes in the paper. 3. A receptor, or apparatus, which, at the receiving-station, marks on a paper certain black points, corresponding to the holes already mentioned made in the paper at the transmitting station. 4. A translator, or machine by which the telegraphic marks or spots are *translated into the ordinary alphabet*. The translator has eight keys, placed in two rows of four each, with a ninth key in a separate place. By a proper combination of these keys, a wheel in connection with them may be made to present to the paper which is to receive the impression any letter required. The ninth key prints it. All the contrivances are made to work together by means of various details, which do not admit of description here. Professor Wheatstone states that by means of this apparatus he can transmit five times as many signals to moderate distances as by the usual methods. The chief advantage of the system appears to be, that the manual operations it requires are extremely easy, and require scarcely any intellectual effort.——It is proposed that poplar-trees be planted along all our railways and used as telegraph-posts.——At a meeting of the Atlantic Telegraph Company, the chairman stated that he had received intelligence of the success of the negotiations with the Government, and that a guarantee will be given of 8 per cent. on 600,000*l.* for twenty-five years. The guarantee will not be unconditional. The cable remains in exactly the same state as at the previous meeting. The directors having no adequate funds for lifting and repairing, a new Act will be obtained, in order to raise the necessary capital.——At the time of the failure of the Atlantic cable, we urged, among other suggestions, the desirability of further experiments, with india-rubber as an insulator instead of gutta-percha; and we have since occasionally observed that the subject is obtaining the public attention. Some experiments have just been made at the india-rubber works of Messrs. Silver and Co. of Silverton, on the Woolwich line of railway, and which were witnessed by upwards of 200 scientific and other gentlemen interested in the subject. The result was the production of an insulating covering of india-rubber, so impermeable to water as to be capable of withstanding a hydraulic pressure of 1,000 atmospheres, and so little apt to be injured by softening under heat, that it was put into boiling water without affecting the insulation.—— It is said Mr. Henley is preparing, at the Newfoundland end of the Atlantic cable, for renewed attempts to resuscitate the line, when it can be underrun in the advancing spring.—— The Red Sea telegraph has passed Madeira on its way in two screw steam-ships, the *Imperador* and *Imperatriz*, to Suez, whither Messrs. Newall and Gordon, the contractors, are to proceed shortly to superintend the laying of it down.——Mr. Lindsay, of Dundee, has been sending messages across the Victoria Dock there without any cable: the breadth of the dock is 500 feet.——The proprietors of the St. Rollox Ironworks have caused a telegraphic wire to be laid between their Glasgow establishment and the works at Motherwell. This, we believe, is the first instance in Glasgow of a private telegraph being adopted.

* An interesting memoir of Sir William Armstrong appears in the *Gateshead Observer* of the 12th of March instant.

CHURCH-BUILDING NEWS.

Cardiff.—St. Mellon's Church has been very much restored to its original style and character. Mr. Freeman, of Lanrumney, who paid the cost, employed Mr. Scott as the architect. The interior has been entirely new ceiled, and the woodwork left exposed: at the termination of the ceiling a cornice has been run round the walls, and the old oak carvings in the Virgin Chapel have been retouched and given their original appearance. The principal of the exterior works are the partial restoration of the roof, new coping of the western gable, running from a cross centre piece, and an entire new porch. The whole has been carried out by Messrs. James and Price, of this town. Re-pewing is contemplated: at present part of the seats are the old settles of the thirteenth century, and there are some old high pews. The improvements cost about 350*l.*

Liverpool.—The foundation-stone of the new church in Finch-street, to be called St. Mary Magdalen's Church, has been laid. The site is on the south side of the street, and the land, which has been purchased from the corporation, was formerly covered with houses of the worst description, all of which have been pulled down. The design of the church has been entrusted to Messrs. Hay, of this town. The style will be Gothic, of the Decorated period, and the materials of which the edifice is to be erected will be chiefly brick of three colours, and white stone for the tracery and mullions of the windows. The elevation to Finch-street will present four large three-light windows, with lofty gables over each, the westernmost being surmounted with a bell-turret and floriated iron cross about 80 feet from the ground. The church will be 70 feet long by 47 feet wide, and will consist of nave and aisles, the aisles with high arched gables running in at right angles against the nave. There will not be a clerestory, but a gallery round the three sides, which, with the ground-floor, will accommodate about 800 worshippers. The chancel will be formed by means of traceried screens on the north and south sides, one of them enclosing the vestry, and the other fronting the organ. The roof will be of open and framed carpentry, which, together with the pewing, will be all stained and varnished. On the north and south sides will be four larger three-light windows, filled in with geometrical tracery. Immediately under these are three-light segment windows to give light below the galleries. Economy has been studied throughout, and the contract is taken for 1,700*l.* by Mr. John Pooley, of Liverpool.

Malton.—The foundation-stones of the two chapels in the new cemetery at Malton have been laid. The architect is Mr. John Gibson,

Malton: the contractors for the buildings are—masons' work, Messrs. Dove, Scarbro'; carpenters' work, Mr. Martin Dodsworth, Malton; smiths' work, Mr. Shouksmith, York; painters' work, Mr. Wm. Wilson, Norton, Malton. The ground is laid out after a design by Mr. George Wm. Slater, of Malton; contractor, Mr. J. Bowker, of Scarborough.

Shields.—The Methodist New Connection Zion Chapel, Laygate-lane, South Shields, has been completed and opened. The façade stands obliquely to Laygate-lane. The architects have availed themselves of an irregularity of site to give greater apparent space in front of the chapel, as it is approached from Commercial-road. The block of buildings extends 136 feet westward, down Palmerston-street, and comprises a chapel 58 feet by 43 feet 6 inches, and 31 feet high (inside dimensions); a school-room, 45 feet by 30 feet; and three vestries, with the usual outbuildings. Over the vestry, &c. three rooms have been provided for the chapel-keeper. The walls are of brick, with Prudham stone dressings. A flat ventilating roof has been adopted, running only to two-thirds of the height that would have been required had the sides been sloped up to a ridge. The style of the building is modified Italian. The principal feature of the interior is the pulpit platform. It is supported on ornamented iron columns, with pierced iron columns, forming a railing round it. Immediately under this platform is the communion space, enclosed by polished oak rails supported on wrought-iron standards. The artificial lighting of the chapel is by means of two sunlights in the ceiling, with wall brackets under the galleries. The heating is effected by means of gas-stoves. The chapel will accommodate nearly 700 adults, one-fourth free. The school-buildings are similar in character to the chapel—ventilation and light being primarily attended to. The height of the school is 19 feet to the wall-plate, and 25 feet to the ceiling in the centre of the room.

STAINED GLASS.

Ripon.—A new monumental stained glass window, by Messrs. Hardman, of Birmingham, has been placed in the north aisle of the nave of Ripon cathedral. The window is of three lights; style, late Perpendicular. Under white flowered canopies are these subjects:—The centre is a picture of the Last Supper, our Saviour at the head of the table, and at the foot, Judas with his money-bag. The compartment to the left or east of the centre figures, represents the Resurrection. The other division has the Ascension. In the small upper lights are the four prophets and angels holding a scroll. At the foot, in ornamental black letter, is the inscription in memory of members of the Waddilove and Oxley families.

Manchester.—Another stained glass window has been placed in Manchester Cathedral by Messrs. Edmundson and Son. The subjects represented are the following:—The Transfiguration; type, Elijah taken up to heaven. The Raising of Lazarus; type, The raising of the widow's son. The Triumphant Entry into Jerusalem; type, David crowned at Hebron. The Last Supper; type the Paschal Lamb. The upper part of the window is filled with tabernacle work and canopies with niches containing figures of the four evangelists, surmounted by angels bearing scrolls. The inscription at the foot of the window reads as follows:—"To the honour and glory of God, by a citizen of Manchester, once a chorister in this church: A.D. 1859." This is the fourth gift of a like order by the same gentleman. It is placed on the south side, next the Chapter-house. The Dean of Manchester selected the subjects.

Bakewell.—The middle window of the Vernon Chapel, in Bakewell Church, has been filled with stained glass as a memorial to the late Duke of Rutland. The work was entrusted to Messrs. Hardman and Co. of Birmingham. The subject is "The Resurrection," treated allegorically. In the centre light our Lord is represented in a white diapered robe edged with gold, and standing triumphant on a tomb of Gothic design, his right-hand held up in the attitude of benediction. It is surrounded by a glory of ruby colour, with angels' heads in the margin. In the lower part of each of the side-lights three Roman soldiers are represented. A cloud stretching across these three lights "conceals from their Pagan eyes the glorious signification of the Resurrection as revealed to our Christian faith." In the upper part of each side-light is seen one of the witnessing angels descending towards the tomb; whilst in the lights of the head a choir of angels celebrates the glorious event. In the highest light of the head of the window the Holy Spirit is seen descending as a dove surrounded with a glory. Beneath the window is a brass with the inscription.

PROVINCIAL NEWS.

Cambridge.—The Guildhall Committee, aided by the Committees of the School of Art and the Public Rooms Fund, have succeeded in obtaining 4,000*l.* towards the new public rooms. The rooms are for county as well as for town and university purposes. The subscription list remains open, as the committee desire to present 4,000*l.* to the Corporation, free of all deductions.

Ely.—The new national schools erected in Walpole-lane, in the parish of St. Mary's, and Broad-street, in Trinity parish, are now completed. The first stone of the Walpole-lane buildings was laid in April last, and those in Broad-street, in August last, by the late Very Rev. Dean of Ely. There are class-rooms to the Walpole-lane schools, and also residences for both schools. The buildings are intended for boys, girls, infants, and adults, and are constructed with stone jambs and heads to the doors and windows, stone strings, copings, &c. &c., all of Ancaster stone. The walls are built with Ely white bricks. The roofs are open, and timbers stained and varnished. The play-grounds are divided with walls, and regard has been paid to the drainage and water supply, which have been carried out under the rules of the Board of Health. The architect is Mr. S. S. Teulon, of London, and the whole of the works have been carried out by Mr. Freeman, of Ely. The cost of the works (exclusive of sites) is 4,000*l.* which sum has been raised by grants from the Committee of Council on Education and donations from the Dean and Chapter, who presented the sites of each building and a large sum. The deficiency has been raised by subscription.

Rochester.—Watt's Almhouses are approaching completion, but the flooring is not all down yet. The style of the building, which is described as a kind of bastard Elizabethan bordering on the grotesque, is said to have elicited much comment. The staircases at different parts of the building are stated to be very narrow and rickety, and to have been planned seemingly after the style of the disagreeable circular staircase in Rochester Castle. The outline of the building is broken by petty details and peaks and pinnacle. The architect is Mr. Charles Ross Foord.

Weston-super-Mare.—Archdeacon Law has given to his parishioners in Weston-super-Mare the sum of 4,000*l.* for a town-hall, ball and concert room.

Yeovil.—The new Corn Exchange building, recently erected, has now been formally opened. The new building stands in an obscure situation, on a piece of land between the back of the Town-hall and the Cheese-market. It is a light and lofty room, about 34 feet square: the glass roof is supported by transverse iron girders, manufactured by Mr. Rowe, ironmonger, Sherborne. The building for pitching the corn in is immediately opposite the Corn Exchange, and is 35 feet long, the roof of which is also composed of glass on iron girders, manufactured by Messrs. Hannan and Gillett, of Yeovil. The erection of the building was entrusted to Mr. Chant, builder, Yeovil.

Newport.—At a meeting at the Town-hall for the examination of the tenders sent in for the new markets, that of Mr. John Cobb, of Newport, was decided upon.

OPENING OF JARROW NEW DOCKS.

THE formal opening of the second dock of late years constructed on the River Tyne has now taken place. The North-Eastern Railway Company are the proprietors of these docks, which are situated at Jarrow Slake, Shields, near Newcastle. They were begun in 1855, and have occasionally been already referred to in our columns. The Northumland Docks of the Tyne Commissioners occupy a site at Hayhole, on the opposite, or north side of the river. The accommodation consists of a water area of 48 acres, and four shipping jetties, each having shipping places for nine large vessels, and about 12,000 tons of coal per day may be shipped at these drops. Lines of railway several miles in length have been laid adjacent to the docks, as standage accommodation for waggons. There will also be two shipping places in the river for loading river craft with coals, &c., for manufactories, and a jetty for discharging ballast from vessels by means of hydraulic cranes erected by Sir Wm. G. Armstrong and Co., of the Elswick Ironworks, Newcastle. Another jetty is to be constructed for the goods traffic. For the jetties, 400,000 feet of Baltic timber have been required, and 600,000 cubic feet of Ashlar, in freestone, from Yorkshire, for the docks. There have also been used nearly 20,000 feet of Aberdeen and Cornwall granite. The tidal lock is 100 feet wide, and 250 feet long, and has entrance-gates 60 feet wide. The gates at the tidal entrance have been made by Messrs. R. Stephenson and Co., of Newcastle: they are 80 feet wide, and weigh nearly 600 tons. They are worked by hydraulic machinery, supplied from the establishment of Sir W. G. Armstrong and Co. The docks have been enlarged from time to time during the progress of the work, in anticipation of increased traffic. Mr. T. E. Harrison, C.E., was engineer in chief of the works; Mr. R. Hodgson, resident engineer. The engineers for the contractors were Messrs. T. Scott, P. Stewart, and T. Dakin. Messrs. T. Scott and John Milburn were the inspectors of the works for the company. The contractors for the whole works were Messrs. Jackson, Bean, and Gow. Sub-contractors—for the locks, Mr. Jos. Greenwood; for the quay wall, Messrs. Heaps, Kelly, Milburn, and John Ramsey; for the excavations, Messrs. J. Hill and William Briggs.

KENSINGTON GORE ESTATE.

IN the early part of last year the Commissioners decided upon pulling down Gore and Grove Houses and the old wall in front of them, and an opportunity was thus afforded to the public for seeing the grounds in the rear, the extent of which formed the subject of remark by every passer-by. During the winter months operations have been going on towards filling in the upper part of the property, to form a sort of raised terrace. It is curious to note the extraordinary distances from which the dry rubbish has been brought at Kensington Gore. It has been carted from Bermondsey, King's Cross, Holborn, Gray's Inn-lane, Camden-town, St. John's Wood, Oxford-street, Marylebone, Fleet-street, Vauxhall Bridge-road, Chelsea, and Hammersmith. Nearly one hundred thousand loads have been already so deposited.

THE NEW HOSPITAL FOR THE COLDSTREAM GUARDS.

SIR,—You have given us so many good and beautiful examples of architecture in the *Builder*, that I think I am really laying you under a great obligation to me by pointing out to you a specimen of the most extraordinary architecture (at the new Coldstream Guards Hospital, in Vincent-square) I have ever seen. Do go and look at it, and give us a woodcut of it in the *Builder*. Two huge brick tubes, or shafts, containing fireplaces, pass through the room!

It is quite worthy of having public attention directed to it; for never, surely, since Nebuchadnezzar, or some of the kings of ancient Egypt, was anything built like it. One expects to see Rameses the Great, with his hands on his knees, to complete the decoration; or a furnace with Shadrack, Meshech, and Abednego, in it.

Is it the invention of the unassisted genius of the Guards? SHAKO.

*** The effect of the two huge brick cylinders passing from floor to ceiling in the centre part of the room is certainly startling, if not beautiful. There is doubtless some recondite motive for the strange disfigurement, and we shall be glad to have some information on the subject. Whose was the directing mind? The beau that sped these shafts ought to be known to fame!

COMPETITIONS.

Perth.—The committee of the parochial board having obtained three plans and specifications for building a new poor-house,—one by Mr. Heiton, cost 7,140*l.*; the second by Mr. Readdie, cost 7,346*l.* 3s. 2d.; and the third by Mr. Smart, cost 8,700*l.*; all which plans were exhibited for a week in the council-room, that the public might have an opportunity of inspecting them,—submitted Messrs. Heiton and Readdie's plans to Mr. Matthewson, architect to the Board of Public Works, Edinburgh, who gave his decision in favour of Mr. Heiton's plan. The board appointed Mr. Heiton as architect to superintend the erection of the building.

Manchester.—According to the local *Examiner*, upwards of 500 architects have applied for instructions relative to the competition for the new assize courts to be erected in that city! We further hear that it is the intention of the committee of the proposed building to give the public an opportunity of seeing such designs as may be

forwarded; at any rate they should do so, and at once.

Rose-hill Schools, Dudley.—This was a limited competition, confined to Dudley architects, and upon the envelope bearing the motto of the successful design ("Progress") being opened, it was found to be by Mr. William Wigginton. The buildings, we are told, are to be proceeded with forthwith. In this competition a premium was given to the unsuccessful, as some little compensation for services rendered.

SANITARY IMPROVEMENT OF CHURCHES.

AT Marylebone Police-court, Mr. Knight, receiver of rents of pews in St. Mark's Church, Hamilton-terrace, St. John's-wood, attended before Mr. Long, on a summons obtained against him by Dr. Thompson, Medical Officer of Health for Marylebone, at the instance of the vestry of the parish, the said summons setting forth that the church, for want of proper ventilation, was injurious to health.

Dr. Thompson stated that, in consequence of numerous complaints which had been made with regard to the insufferable nature of the atmosphere in the church, particularly in the summer, he had made an examination of the structure, and found that the ventilation was defective, so much so as to be calculated to injure health.

The Rev. Mr. Bellew, doing duty at St. Mark's, gave evidence as to the injury and inconvenience caused to him by the condition in which the church was.

Defendant, on being asked what answer he had, replied that he merely received the pew-rents, and handed them over.

After some further proceedings, an order was made for the proper improvements to be carried into effect within twenty-eight days.

INCOMPETENT FOREMEN AND THE APPRENTICESHIP SYSTEM.

SIR,—Will you permit me to offer to the consideration of the building trades a few thoughts relative to the above subjects, noticed recently in the *Builder* (p. 158). Reference was made to the constant complaints of the incompetency of builders' foremen. One can hardly suppose such complaints to be unfounded; but whose is the fault? If employers, as they generally do, keep from all personal contact with their men, issuing all orders and receiving all reports, including the capabilities of their workpeople, solely through foremen, they must expect sometimes to have incompetent men thrust into these responsible situations.

With all due respect, I say that if employers would treat us with a little less of that freezing dignity so often seen, and by personal observation make themselves acquainted with the qualities of every *employé*, they would have little difficulty in selecting steady, capable men, who are now passed over, simply because they happen not to be the friends of those whose recommendation is followed by the "governor." But, unfortunately for all parties concerned, most employers appear to deem it *infra dig.* to pass a word with, to elicit an explanation from, or give an order to, a mere journeyman.

But employers not only suffer from incompetent, but still more so from drinking, foremen. To say nothing of the direct neglect of duty from this cause, it is well known that vast numbers of dissipated workmen are kept in employment because they are boon companions of the foreman, or constantly standing treat for him. We often have been, and still are, charged with being fonder of the pot, the pipe, and the skittle-alley, than attending mechanics' institutes, and pursuing mental culture. Why, sir, here is a direct premium offered to antagonistic habits. I venture to say there is scarcely a workman who has been in London a year or two but knows perfectly well that sober habits and moral conduct are no recommendations to a by no means small portion of metropolitan builders' foremen.

If it is not presumption on my part, I would respectfully counsel employers to promote sober, moral, intelligent workmen, those they by personal observation know to be such. Let it be distinctly understood by the entire body of men, that these are essential for regular employment and future elevation to responsible positions, and, depend upon it, we should soon see a marked improvement not only in the habits and manners of men, but in the execution of their daily work, thus proving a source of satisfaction as well as profit, instead of being, as is too often the case, a source of considerable annoyance and positive loss to masters.

I now turn to the letter of "An Architect and Wellwisher." This gentleman traces the redundancy, especially of indifferent workmen, in the building trades, to the practical abolition of seven years' apprenticeship. He mournfully asks, where now are the skilful artisans, such as flourished in olden time? Let me assure him that even in these degenerate days, where good and well-paid work is to be done, good workmen are to be found to do it. Of course it would be invidious to mention names, but I dare affirm that there is work now executed in no respect surpassed by bygone generations; nevertheless there are, it must be confessed, large numbers of indifferent workmen in the building trades, especially amongst carpenters; but has not the modern mode of *running up* (*not building*) houses, as seen in suburban districts, something to do with making indifferent workmen? I think it has. Let any number of men be placed on good work, with fair time to do it, and we may fairly and reasonably expect the majority to turn out good, fair workmen; but let them be put on to such villanous gimcrack work as is to be found in the outlying districts of London, and the best of workmen will inevitably become deteriorated, and ultimately totally incompetent to execute good work. Here, then, is one cause of the redundancy of indifferent workmen in all branches of the building trades, a cause which we, the operatives, are not responsible for, but rather the victims of. Unfortunately, we are without any immediate remedy for this mad rage for cheapness: we can only hope that dear-bought experience will convince the public of the folly of pretentious slap-dash building in preference to the substantial erections of former years.

In these remarks I do not intend to deny that a change in the apprenticeship system is necessary. On the contrary, I think improvement is imperatively required, but not in the direction indicated by our "Wellwisher." Observation convinces me that it is morally and physically wrong to place a boy of fourteen years of age at hard work, and exposure to the ordinary influence of an English workshop. At that age the human frame is not sufficiently knit and solidified to sustain the ordinary toil of building trades without injury. When the boy has merged into the full-grown youth of sixteen, he is physically able to enter upon the serious duties of life. And this, in fact, is the age at which lads generally are put to the bench, even if apprenticed when fourteen years old; the interval being spent in running errands, cleaning knives and forks, boots and shoes, sweeping out shop, and similar jobs; exposed to the kicks, cuffs, and blasphemous expletives of brutalized, intemperate workmen,—within hearing of the filthy talk, ribald jests, and profane language unfortunately too common. This is the preliminary trade-teaching of those who it is desired should turn out first-class workmen. Now, instead of these two years being spent in so profitless a manner, I suggest, that for the raising up a race of superior, intelligent mechanics, this time be devoted to an elementary trade education, where the youth would become initiated into the application of geometry, drawing, mensuration, &c. to his future trade, and the theoretical part of everything necessary to constitute a first-class artisan: at the same time habits of steady industry should be inculcated, as well as settled moral habits, to resist the gross temptations of the workshop.

We require a new order of things: the interests of humanity demand it:—

> New times demand new measures and new men:
> The world advances, and in time outgrows
> The laws that in our father's days were best;
> And, doubtless, after us, some purer scheme
> Will be shaped out by wiser men than we,
> Made wiser by the steady growth of truth:
> We cannot bring Utopia at once.

Nevertheless, we may consistently strive to realize some of our imaginings, Utopian though they may appear to many. But some will inquire, Where are the means to embark in so comprehensive a scheme as you propose? "An Architect" very appropriately calls attention to the wealthy guilds or companies in the City. Some of them have enormous revenues, which, if wisely appropriated in the direction I have indicated, would, I believe, do far more good in one year than centuries of protecting and monopolising arrangements. I certainly agree with our "Well-wisher," that it is a disgrace the fine old hall of the Carpenters' Company should be perverted to such a use as it is. What a glorious educational institution it would make! Here is the first essential, "a local habitation," ready to hand: with that it would be strange if we could not succeed in diverting some of the useless income to the purpose contemplated: these, with well-digested plans, trades subscriptions, and other available means, would furnish machinery to carry the foregoing suggestion into practical effect.

Working men of London! are the thoughts here put forth worth consideration? Are they worth being resolved into the actual and real? If so, let us have our aggregate trades' meetings, and endeavour to evolve some prudent and conciliatory plan of action, that will test the soundness of our "Wellwisher's" belief in the growing disposition of the influential men in these guilds to fall in with the onward progress of the age, and help forward the social and intellectual elevation of our order.

WILL JACKPLANE.

Books Received.

Sketch of the Civil Engineering of North America. By DAVID STEVENSON, F.R.S.E. and C.E. &c. Second edition. London: Weale, 59, High Holborn. 1859.

THE author of this little volume has been induced by Mr. Weale to republish it after a lapse of some twenty years, the treatise being revised, and the purpose being chiefly its application to new countries, and particularly to India, where, no doubt, engineering works on an extensive scale will soon be in full operation. Indeed, we quite agree with Mr. Weale in thinking that this treatise, though its examples are mainly or altogether American, might, with strict propriety, be styled a "Sketch of Civil Engineering Practice, applicable to new Countries."

It treats of harbours, lake and river navigation, steam navigation, fuel and materials, canals, roads, bridges, railways, waterworks, house-moving, and lighthouses. The examples of harbour formation comprise remarks on tides, quay construction, jetties, cranes, graving, screw, and hydraulic docks, landing slips, &c. with examples of harbour engineering, at New York, Boston, Philadelphia, Baltimore, Orleans, Quebec, Montreal, Halifax, &c. The chapters on lake and river navigation of course relate to the great American lakes and rivers chiefly, and that on steam to the practice on these waters. The building materials, treated of in the fifth chapter, are brick, marble, granite, woods, &c. An interesting account of the great inland canal navigation of America is given in the ensuing section; and on the subject of roads, we have all about the primitive "Corduroy roads," as well as the "National roads," and the Macadamized and other roads of America. The subject of American bridges is an interesting one, as we have had occasion now and then to show: various special bridges are described, as well as the "patent lattice," and "patent truss," bridges, &c. Perhaps no portion of the treatise will apply more strictly to India than what is said of the railways, roads, and bridges of America, particularly the first of these, and this constitutes one of the principal divisions of the book. In the chapter on Waterworks, descriptions of the Croton and Washington, the New York and Boston, Montreal, Philadelphia, and various other waterworks are given. "House-moving in America" is rather a curious subject, and, like most of the other species of engineering works treated of, is illustrated by engravings.

Altogether, and with reference to our colonies, and the opening up of our Indian empire especially, this is a timely, well-adapted, and useful little treatise.

Recent Practice in the Locomotive Engine: comprising the latest Improvements and a Treatise on the Locomotive Engines of the United States. By DANIEL KINNEAR CLARK, C.E. London, and ZERAH COLBURN, C.E. New York. Blackie and Son, Edinburgh, London, &c.

THIS work is being issued in about eight parts, of which four are now before us. These consist of imperial quarto plates, with explanatory letter-press and wood-engravings, the whole forming a portion of an elaborate and important professional work upon the anatomy and physiology of the iron horse, and its development up to the present day. The treatise is also in some measure supplementary to the work already issued on "Railway Machinery," and which was some time since noticed in our columns.

Rudimentary and Practical Instructions in the Art of Paper-Modelling in Architecture. By T. A. RICHARDSON, Architect. London: Weale.

THAT which is worth doing at all is worth doing well. Architectural modelling in paper may be much more ornamental than useful; but at least let it be ornamental, and a well-constructed model, with its adjuncts of imitation lawn and shrubberies, fields and groves, may be admitted to be no mere trifling or paltry ornament: it may even be more useful than a mere perspective view, in presenting an idea of an architectural design, whether of church or mansion, farm-steading or villa, especially to a non-professional capitalist or landlord. But it can be neither truly useful nor really ornamental, unless constructed with such exactitude or nicety as is here very distinctly and clearly instructed. The little volume is illustrated by explanatory woodcuts, which will greatly aid the student, as will the description of modelling implements also given.

Miscellanea.

CONCENTRATION OF THE LAW-COURTS.—In reply to a question in the Commons' put by Mr. B. Hope, Lord J. Manners, as first commissioner of works, sated that the Government are not prepared to take any steps in this matter, in consequence of the great differences of opinion on the subject; but it was, he remarked, a very proper one for an inquiry, and the only question was, whether that inquiry should be by royal commission or select committee. His lordship promised to communicate the views of the Government on the subject.

SPACE AT BRITISH MUSEUM.—In the House of Commons, on the 21st inst. Mr. Gregory gave notice that he would on an early day move for a select committee to inquire into the means of obtaining increased space for the extension and arrangement of the British Museum. He had previously brought the subject under notice, but in too thin a house. There was then a majority of twenty-one to two, however, against the addition of a clause as to the best means of rendering the various collections available for the promotion of science and art.

THE PROJECTED TOWN-HALL AT CROYDON.—For the erection of the projected Town-hall and Literary Institution at Croydon, several plans from various architects are before the commitee of the Croydon Town-hall Company. Of the various competing plans, one proposes, at a cost of 2,200*l.* the erection of a hall to accommodate 700 persons, with galleries to accommodate 200 more, and offices for the Literary Institution on the first and second floors. A second plan suggests a hall to accommodate 1,030 persons, exclusive of 70 sittings in the orchestra, and of standing-room in the aisles and vacant places; the Literary Institution being a separate building; the former involving a cost of 1,560*l.* and the latter of 1,100*l.* The architect adds that these sums exceed the prescribed cost (2,200*l.*), and alleges that it is impossible to build a large hall capable of accommodating 1,000 people, and give the various offices required in the particulars, for the limited amount proposed—namely, 2,200*l.*

TESTIMONIAL TO AN EMPLOYER.—We are asked by the workmen in the employ of Mr. Stevens, builder, of Southampton, to mention the presentation to him of a resolution of thanks on their part for his liberality. It was illuminated by Mr. W. C. Clark, of Southampton, and was presented by a deputation on Saturday evening last.

BUILDING AND SANITARY PROGRESS AT LIVERPOOL.—From the 21st annual report of Mr. Rishton, the building surveyor to the local health committee, it appears that during the past year 1,717 new houses have been erected, with accommodation for 10,302 persons, and that only 84 of these houses are in the form of courts, but that these courts are well ventilated and supplied with conveniences for removal of refuse, &c. The water-closet is now general throughout the town, not only for small cottages, but even for cellar tenements. Since 1838 there have been 31,204 houses erected within the borough. In 1841 the number was 1,761; in 1845, 3,728; in 1851, 837; and in 1857, 1,520.

NEW BUILDINGS FOR THE PATENT OFFICE.—A report from the Commissioners of Patents to the Treasury has been prepared, in which authority is asked to apply a sufficient portion of the surplus now derived from the fees paid on patents for the erection of a museum for the preservation and exhibition of the models deposited with the commissioners, and for the erection of suitable offices. In 1855, the commissioners established a free library: it has gradually become a collection of great interest and importance, and a largely increased accommodation is urgently required. The balance-sheet of income and expenditure for 1858, prepared and shortly to be laid before Parliament, shows a surplus on the year of 5,900*l.* thereby increasing the total surplus to 11,900*l.* The work of printing the old specifications being completed, the expenditure on that head ceases altogether, and, consequently, the surplus income of the current year is estimated at 21,600*l.*; so that leaving a margin of 3,500*l.* the sum of 30,000*l.* may be safely estimated as available for building purposes at the end of 1859, and the surplus in each subsequent year will be about 20,000*l.*

MAJOR FITZMAURICE'S NEW LIGHT.—Wonderful things are alleged as to this "new light," and the gas companies may look out; but so many new lights have failed to keep the promise of their warnings, that there may be a hitch here too. Meantime we may state that on the 15th of March, the Hon. Major Fitzmaurice is said to have visited the Penrhyn Slate Quarry, near Bangor, North Wales, for the purpose of exhibiting his newly-discovered light; and that the results were "most extraordinary." The numerous steps of the quarry, some even at a distance of 800 and 900 yards, "were as clearly seen as in daylight." This light, it is said, is applicable to a variety of purposes. The colours of furniture, dresses, &c., are rendered unusually vivid, and photographs can be taken in ten seconds. It is free from injurious fumes, and consequently does not affect paint, gilding, or articles of delicate colour. It is also easily manufactured, and very cheap. A light equal to that of thirty candles can be produced at a cost of one halfpenny an hour. If all this be correct, the objects our old correspondent J. E. D. had in view in the invention of that mode of lighting which is called "sun-light"—exclusively from ceilings or from above the level of the objects illuminated—would appear to be now realizable to a high degree of splendour and perfection. On J. E. D.'s views [see *Builder* of 1847, p. 281], "the whole flood of light should primarily descend from above;" and the result, as realized in the lighting of the stage of a provincial theatre, by the clearing away of all foot-lights, and "the bold substitution of a central congeries of lights in the very body of the house, and almost in the place usually occupied by the chandelier, with a reflector sufficiently large and powerful to turn the whole flood of light upon the stage, at about an angle of 45 degrees," was the infusion of "an unusual brilliancy, and yet a pure and chastened serenity of general effect," especially on the countenances and the drapery of the *dramatis personæ*. Of this peculiar effect of the "sun-light," every one can, even now, to some extent judge, since so many public halls, churches, &c. are being more or less strictly lighted on J. E. D.'s principle; and it only requires a really brilliant and vivid light to realize it in all its perfection; but whether the Fitzmaurice light be destined to do so, remains to be seen. There were hopes of the electric light doing so; and the effect, when tried in Her Majesty's Theatre, a few years since, was very fine, as we noted at the time; yet nothing more has come of that light hitherto.

INSTITUTION OF THE FINE ARTS; PORTLAND GALLERY.—The twelfth exhibition of this society, now open, includes 599 pictures, and one piece of sculpture by Ebenezer Bennet. Wanting in works of a high order of merit, presenting rather the aspect of a collection of enlarged landscape photographs in colour, it is nevertheless an agreeable, indeed interesting collection, and will call for more detailed notice hereafter. Mr. Rossiter, Mr. Henry Moore, Mr. A. Montague, Mr. Carrick, Mr. R. H. Mason, Mr. Smallfield, Mr. H. Moore, Mr. L. J. Wood, Mr. John Thorpe, Mr. C. Pettitt, and Mr. J. G. Naish are the most successful contributors.

FALL OF NEW BUILDINGS IN COVENTRY.—An alarming accident has occurred in Ford-street, Coventry. A new three-story house was being built at the end of a row of some ten other houses. The house in course of erection had so far progressed towards completion that the persons employed on it had begun to roof it in; but it appears, according to the local *Herald*, to have been built in so slight a manner as to be unable to stand the slightest shock. A rather strong gust of wind caught the house and tore a great part of it down. The party-wall—or at least the greater part of it—fell, carrying with it the party-wall of the upper part of the adjoining house. No one was injured, as the workmen fortunately were at dinner.

INDURATING STONE.—Sir: I have from time to time noticed in your paper the statements relative to the numerous patents for "preserving stone." Any information upon the subject will, probably, therefore, be interesting to your readers. In the years 1856-57 the corn-exchange in this town (Chelmsford) was erected under my superintendence. The front being almost entirely of Bath stone, Mr. F. Ransome, of Ipswich, applied to me to be allowed to dress it over with his composition. I hesitated at first, but eventually allowed him to treat the top of the cornice and the balustrade. This was done in the spring of 1857, and at that time there were two pieces of the capping of the balustrade which were rapidly disintegrating, and which the builder was to replace. I was somewhat alarmed one morning upon going to the building to find the balustrade had apparently been whitewashed, and repented having given my consent. However, this appearance soon went off, and upon an examination of the work the other day, I found the whole of the stone which had been dressed perfectly hard and round, and the disintegration in the two defective pieces arrested. I think this last fact proves the efficacy of the operation.—FRED. CHANCELLOR.

SOCIETY OF ARTS.—On Wednesday, March 16, Sir Richard Bethell, M.P. in the chair, a paper was read "On Trade Marks," by Professor Leoni Levi. The author pointed out the importance of the British manufacturer continuing to maintain the high character he had gained in the markets of the world, and for this purpose it was necessary not only that no deterioration should take place in the quality of the articles produced by him, but also that no idea should gain currency that such deterioration had taken place. The imitation of a trade mark was illegal in this country, though there were cases in which the law had been evaded, some of which were mentioned. In some foreign countries, however, such palpable frauds took place, owing to the imitation of many of our trade marks, that serious loss, both of profit and character, was sustained by the British manufacturer. The country where this might almost be said to have become a system was Prussia; and whilst our English courts of law gave the fullest remedy to the German manufacturer against similar attempts here, there were at present no legal provisions in Prussia against this grievance. France had already entered into treaties with various other powers to prevent such proceedings, and it was incumbent upon the Government of this country to use every endeavour to remedy this serious evil.

THE GENERAL POST-OFFICE YARD.—You inserted some little while back a paragraph on the disgraceful state of the yard of the Post-office: in consequence of that and various other letters in several papers, the authorities have actually boarded up some part of the railing, to annoy if they can the inhabitants who have justly complained of the nuisance. The boarding erected is of no earthly use (and I doubt if it is done by the architect's orders) in fact, after dusk, the pavement on that side of the way is a perfect common nuisance. A word, sir, from you will perhaps have some effect.—OBSERVER.

*** Why should the area be used as a rubbish yard? Surely some other place might be provided as a receptacle.

DISCOVERIES NEAR BETHLEHEM.—A letter from Jerusalem, in the *Gazette du Midi*, says,—a very important discovery has been made in the neighbourhood of Bethlehem, near the spot where the angel appeared to the shepherds. Some workmen, when employed in making an excavation, found the ruins of an immense convent of the period of St. Jerome. The cisterns are very large, regular, and in a perfect state of preservation. The mosaic pavements of several rooms have been already laid bare, and the workmen are on the trace of the marble pavement of the church.

TENDERS.

For erecting and finishing St. Paul's Church, Broke-road, Haggerston. Mr. A. W. Blomfield, architect. Quantities supplied by Mr. T. M. Rickman and Mr. J. A. Bunker:—

Hocken	£7,740	0	0
Child, Son, and Martin	6,900	0	0
Patman	6,475	0	0
Myers	6,235	0	0
Browne and Robinson	6,146	0	0
Trollope and Sons	6,073	0	0
Holland and Hannen	5,983	0	0

For residence, out-offices, farm-buildings, and lodge, for Mr. Singlehurst, Eathorpe, near Leamington. Mr. R. Clarke, architect, Nottingham:—

Oldham, Leamington	£3,600	0	0
Green, Warwick	3,300	0	0
Dalton, Coventry	3,200	0	0
Bromwich, Rugby	2,896	0	0
Chambers and Hilton, Birmingham	2,653	0	0
Gascoigne, Leamington	2,643	0	0
Norman, Leicester	2,640	0	0
Parnell, Rugby	2,536	0	0
Clifton, Leicester	2,387	0	0
Rooke and Clarke, Nottingham (accepted)	2,350	0	0

For building two villa residences at Sydenham for Mr. R. Murley. Mr. Low, architect. Quantities not supplied:—

Elston	£2,900	0	0
Heritage	2,818	0	0
Wells	2,630	0	0
Walker and Neave	1,865	0	0

For second portion of the Master Bakers' Provident Institution Almshouses, Lea-bridge-road. Mr. T. E. Knightley, architect:—

Perry	£1,267	0	0
Amos	1,231	0	0
Clark	1,198	0	0
Keyes and Head	1,198	0	0
Wood and Son	1,080	0	0

For alterations and repairs to the Somerset Hotel, Strand, for Mr. John Sinclair. Messrs. Finch Hill, and Paraire, architects:—

Turner and Son	£1,782	0	0
Higgs	1,549	0	0
Patrick and Son	1,468	0	0
R. Lawrence	1,429	0	0
Elston	1,400	0	0
Sellick	1,260	0	0

For new dwelling-house, No. 5, Market-street, Oxford-street. Mr. C. Eales, architect:—

Starr	£1,136	0	0
Clements	1,080	0	0
Jackson	1,039	0	0
Airey and Bellingham	998	0	0
Higgs	997	0	0
I'Anson	974	0	0
Willson	941	0	0
Keyes and Head	918	0	0
Batterbury	895	0	0
Sanders	869	0	0
Rudkin	830	0	0

For residence for Mr. Thomas Keavley, at High-cross-road, Tottenham. Mr. Rowley, architect:—

Carter	£473	12	0
Clarke	470	0	0
Powell	397	0	0
Rivett	395	0	0
Child	365	0	0
Humphreys and Son (accepted)	345	0	0

For alterations and additions to the Sturt's Arms Tavern, Hoxton, for Mr. Robert Hart. Messrs. Finch Hill, and Paraire, architects. Quantities furnished:—

Patrick and Son	£750	0	0
Turner and Sons	748	0	0
R. Lawrence and Son	739	0	0
Elston and Son	690	0	0
Smith	648	0	0

For building two houses at Enfield. Mr. George Low, architect:—

Tully and Son	£695	0	0
Walker and Neave	697	0	0
Elston	626	0	0
Hobbs	595	0	0
Packman	589	0	0

For the drainage of West Cliff-terrace, Ramsgate, Kent, for the Rt. Honble. David W. Wire, Lord Mayor of London Mr. W. H. Skyring, architect:—

Taylor, London	£509	0	0
Elgar, Ramsgate	482	0	0
Wallbutton, London	452	0	0
Fowler, London	411	0	0
Smith, Ramsgate	389	0	0
Williams, Potter's Bar	340	0	0